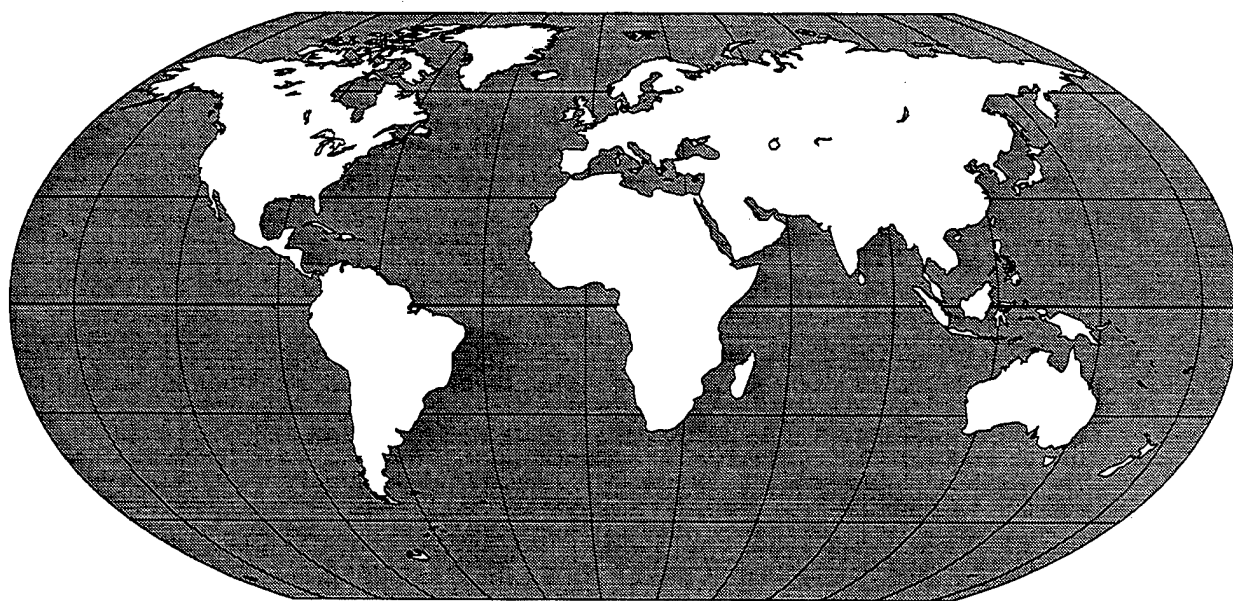


HIGHLIGHTS

1998 Department of Defense Survey of Health Related Behaviors Among Military Personnel



Robert M. Bray
Rebecca P. Sanchez
Miriam L. Ornstein
Danielle Lentine
Amy A. Vincus
Tracy U. Baird
June A. Walker
Sara C. Wheelless
L. Lynn Guess
Larry A. Kroutil
Vincent G. Iannacchione

DISTRIBUTION STATEMENT A
Approved for Public Release
Distribution Unlimited

19990420 032

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.

1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE March 1999		3. REPORT TYPE AND DATES COVERED Final	
4. TITLE AND SUBTITLE * HIGHLIGHTS 1998 Department of Defense Survey of Health Related Behaviors Among Military Personnel				5. FUNDING NUMBERS DAMD17-96-2-6021	
6. AUTHOR(S) Robert Bray, Rebecca Sanchez, Miriam Ornstein, Danielle Lentine, Amy Vincus, Tracey Baird, June Walker, Sara Wheelless, Lynn Guess, Larry Kroutil, Vince Iannacchione					
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Research Triangle Institute P.O. Box 12194 Research Triangle Park, NC 27709				8. PERFORMING ORGANIZATION REPORT NUMBER RTI/7304/006-HLFR	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) Office of the Assistant Secretary of Defense (Health Affairs)/TRICARE Management Activity Skyline 5, Suite 810 5111 Leesburg Pike, Falls Church, VA 22041-3206				10. SPONSORING/MONITORING AGENCY REPORT NUMBER	
11. SUPPLEMENTARY NOTES					
12a. DISTRIBUTION / AVAILABILITY STATEMENT * A -- Unlimited				12b. DISTRIBUTION CODE	
13. ABSTRACT (Maximum 200 words) This report presents the findings of the 1998 Department of Defense Survey of Health Related Behaviors Among Military Personnel. The survey is the seventh in a series of DoD surveys conducted since 1980 -- it has two broad aims: (1) to continue the survey of substance abuse among active duty personnel, and (2) to assess DoD's progress toward meeting selected "Healthy People 2000" objectives for active duty military personnel. As such, it provides comprehensive and detailed estimates of the prevalence of alcohol, illicit drug, and tobacco use, and the negative effects of this use. It also provides estimates for health behaviors pertaining to fitness and cardiovascular disease risk reduction, injuries and injury prevention, sexually transmitted disease risk reduction, cervical cancer screening, and maternal and infant health. In addition, it offers an assessment of mental health of military personnel, including stress and depression, and the special health needs of military women.					
14. SUBJECT TERMS health related behaviors, alcohol, drugs, substance abuse, tobacco use, fitness, injuries, mental health, sexually transmitted disease, women's health				15. NUMBER OF PAGES 137	
				16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT UNCLASSIFIED	18. SECURITY CLASSIFICATION OF THIS PAGE UNCLASSIFIED	19. SECURITY CLASSIFICATION OF ABSTRACT UNCLASSIFIED	20. LIMITATION OF ABSTRACT UL		

This report has been prepared for the Assistant Secretary of Defense (Health Affairs) under Cooperative Agreement No. DAMD17-96-2-6021 by the Research Triangle Institute, P.O. Box 12194, Research Triangle Park, North Carolina 27709 (Phone: 919-541-6000). Robert M. Bray, Ph.D., served as Project Director.

The views, opinions, and findings contained in this report are those of the authors and should not be construed as an official Department of Defense position, policy, or decision, unless so designated by other official documentation.

PREFACE AND ACKNOWLEDGMENTS

The 1998 Department of Defense (DoD) Survey of Health Related Behaviors Among Military Personnel was conducted by the Research Triangle Institute (RTI) under the sponsorship of the Office of the Assistant Secretary of Defense (Health Affairs). The survey is the seventh in a series of DoD surveys conducted since 1980 and has two broad aims: (a) to continue the survey of substance use among active-duty military personnel, and (b) to assess progress toward selected *Healthy People 2000* objectives for active-duty military personnel. As such, it provides comprehensive and detailed estimates of the prevalence of alcohol, illicit drug, and tobacco use and the negative effects of alcohol use. In combination with data from the prior surveys in the series, it provides data for trends. It also provides estimates for health behaviors pertaining to fitness and cardiovascular disease risk reduction, injuries and injury prevention, and sexually transmitted disease risk reduction. In addition, it offers an assessment of the mental health of military personnel, including stress and depression, and examines oral health and dental check-ups, gambling behaviors, and special gender-specific health issues pertaining to women's and men's health.

Many individuals contributed to the success of this study. Among DoD and military Services personnel, special appreciation is due Roger W. Hartman and Patricia Modrow, the Cooperative Agreement Officer's Representatives, who provided valuable guidance and facilitated conduct of the study. Excellent liaison between DoD, RTI, and the Services was provided by Lieutenant Colonel Shirley Newcomb for the Army, Lieutenant Tim Williams for the Navy, Terrance Zline for the Marine Corps, and Lieutenant Colonel James Fraser for the Air Force. We also gratefully acknowledge the efforts of Kenneth Shefflin of the Defense Manpower Data Center for support in obtaining access to military personnel files, and to Robert Hamilton who prepared the raw data for use in constructing the sampling frame and who selected the sample of military personnel. The cooperation of installation commanders, both for the pilot test and the main survey, and the assistance and courtesies provided by the Military Liaison Officers, who coordinated the activities of the data collection teams, were essential for the successful completion of this effort. Finally, we extend our appreciation to the participating Service members whose responses made this effort possible.

Mr. Joe Gfroerer of the Substance Abuse and Mental Health Services Administration, Office of Applied Studies, provided access to the data from the 1997 National Household Survey on Drug Abuse to enable military and civilian comparisons of substance use. Under subcontract to RTI, National Computer Systems printed, shipped and received the questionnaires. They also performed the optical scanning of the survey questionnaires and provided a resulting data file for the analysis.

Many RTI staff members in addition to the report authors contributed significantly to the success of this project by composing the questionnaire, constructing the sampling frames for the Services, coordinating data collection activities, developing the project website, tabulating data, completing various data-processing tasks, and editing and typing the manuscript. In particular, S. Randall Keesling led the data collection task and was assisted by Marjorie Hinsdale-Shouse, who coordinated day-to-day activities with the field sites. Gregory Bray led the effort to develop and maintain a website for the study, and Thomas Morgan programmed the computer application used to monitor respondent participation. Jill Kavee was instrumental in developing the sampling frames and in selecting the sample, and Jun Liu played a key role in developing the sample allocation methodology. Christy J. Crump and Teresa R. Davis performed data imputations, analysis variable construction, and tabulations. Mary Ellen Marsden and Juesta Caddell made valuable comments on the report, and Ashley Murchison assisted in the coordination of the report. Members of the RTI field teams are commended for accomplishing their data collection tasks under rigorous travel and scheduling demands. Finally, thanks are due Richard S. Straw, who copyedited and proofread the report, and to Catherine A. Boykin and Linda B. Fonville, who completed the enormous word-processing requirements.

Robert M. Bray, Ph.D.
Project Director

CONTENTS

Chapter	Page
Preface and Acknowledgments	iii
List of Tables	ix
List of Figures	xi
Executive Summary	ES-1
 1. INTRODUCTION AND BACKGROUND	 1
1.1 Objectives of the 1998 DoD Survey	1
1.2 Health Promotion and the Military	2
1.3 <i>Healthy People 2000</i> Objectives Examined in the 1998 DoD Survey ..	3
1.4 Organization of the Report	4
 2. METHODOLOGY OF THE 1998 DoD SURVEY	 7
2.1 Sampling, Instrumentation, and Data Collection Procedures	7
2.2 Key Measures	10
2.3 Analytical Approach	14
2.4 Variability and Suppression of Estimates	16
 3. OVERVIEW OF TRENDS IN SUBSTANCE USE AND <i>HEALTHY</i> <i>PEOPLE 2000</i> OBJECTIVES	 19
3.1 Trends in Substance Use	19
3.1.1 Unadjusted Trends in Substance Use	19
3.1.2 Trends in Substance Use Adjusted for Changes in Sociodemographic Composition	 22
3.1.3 Trends in Alcohol-Related Negative Effects	23
3.2 Progress Toward <i>Healthy People 2000</i> Objectives	25
3.2.1 Smokeless Tobacco Use (Objective 1)	25
3.2.2 Overweight (Objective 2)	25
3.2.3 Exercise (Objective 3)	27
3.2.4 Blood Pressure (Objectives 4 and 5)	27
3.2.5 Cholesterol (Objective 6)	28
3.2.6 Injuries and Injury Prevention (Objective 7)	28
3.2.7 Seat Belt Use (Objective 8)	28
3.2.8 Helmet Use (Objective 9)	29
3.2.9 Condom Use (Objective 10)	29
3.2.10 Pap Tests (Objective 11)	29
3.2.11 Substance Use Reduction During Pregnancy (Objective 12)	 30
3.3 Summary	31
 4. ALCOHOL USE	 33
4.1 Trends in Alcohol Use	33
4.2 Service Comparisons of Alcohol Use	36
4.3 Correlates of Heavy Alcohol Use	38
4.4 Negative Effects of Alcohol Use	40

CONTENTS (continued)

Chapter		Page
	4.5 Participation in Counseling and Treatment Programs	42
	4.6 Military and Civilian Comparisons	44
5.	ILLICIT DRUG USE	49
	5.1 Trends in Illicit Drug Use	49
	5.2 Service Comparisons of Illicit Drug Use	51
	5.3 Prevalence of Specific Drug Use in 1998	53
	5.4 Correlates of Illicit Drug Use	53
	5.5 Illicit Drug Use and Productivity Loss	57
	5.6 Illicit Drug Use and Drug Testing	59
	5.7 Military and Civilian Comparisons	59
	5.8 Summary	63
6.	TOBACCO USE	65
	6.1 Trends in Cigarette Use	65
	6.2 Service Comparisons of Cigarette Use	65
	6.3 Correlates of Cigarette Use	68
	6.4 Attempts to Stop Smoking Cigarettes	70
	6.5 Military and Civilian Comparisons of Cigarette Use	70
	6.6 Cigar, Pipe, and Smokeless Tobacco Use	73
	6.7 Summary	75
7.	HEALTH BEHAVIOR AND HEALTH PROMOTION	77
	7.1 Fitness and Cardiovascular Disease Risk Reduction	77
	7.1.1 Overweight, Underweight, and Exercise	77
	7.1.2 Blood Pressure	82
	7.1.3 Cholesterol	84
	7.2 Injuries and Injury Prevention	84
	7.2.1 Prevalence of Injuries	84
	7.2.2 Seat Belt Use	85
	7.2.3 Helmet Use	86
	7.3 Sexually Transmitted Disease Risk Reduction	87
	7.3.1 Prevalence of Sexually Transmitted Disease	87
	7.3.2 Condom Use	89
	7.3.3 Knowledge and Beliefs About AIDS	89
	7.4 Summary	91
8.	MENTAL HEALTH, STRESS, AND COPING	93
	8.1 Levels and Sources of Stress	93
	8.2 Stress and Productivity Loss	94
	8.3 Coping with Stress and Depressive Symptoms	95
	8.4 Screening for Depression	97
	8.5 Alcohol, Stress, and Mental Health	99

CONTENTS (continued)

Chapter	Page
8.6	Selected Mental Health Issues 100
8.7	Summary 101
9.	SPECIAL ISSUES IN THE MILITARY 103
9.1	Gender-Specific Health Issues 103
9.1.1	Stress Serving as a Military Woman 103
9.1.2	Cervical Cancer Risk Reduction 103
9.1.3	Maternal and Infant Health 105
9.1.4	Testicular Self-Examinations 108
9.2	Oral Health 109
9.3	Gambling in the Military 109
9.3.1	Prevalence of Problem Gambling 111
9.3.2	Problem Gambling and Alcohol Use 112
9.4	Summary 114
REFERENCES 117
Appendix	
A	Supplemental Tables 123
B	DoD's Survey Liaison Officers 135

LIST OF TABLES

Table	Page
1. Survey Respondents and Performance Rates	8
2. Sociodemographic Characteristics of Eligible Respondent Population	9
3. Substance Use Summary for Total DoD, 1980-1998	21
4. Trends in Substance Use, Past 30 Days, Unadjusted and Adjusted for Sociodemographic Characteristics for Total DoD, 1980-1998	24
5. Progress Toward Selected <i>Healthy People 2000</i> Objectives, Total DoD, 1995-1998	26
6. Progress Toward Selected <i>Healthy People 2000</i> Objectives for Military Women, Total DoD, 1995-1998	30
7. Trends in Average Daily Ounces of Ethanol Consumed, Past 30 Days, Unadjusted and Adjusted for Sociodemographic Differences, 1980-1998	34
8. Trends in Heavy Alcohol Use, Past 30 Days, Unadjusted and Adjusted for Sociodemographic Differences, 1980-1998	35
9. Estimates of Alcohol Use, Unadjusted and Adjusted for Sociodemographic Differences, by Service	37
10. Demographic Correlates of Heavy Alcohol Use, Past 30 Days, Total DoD	39
11. Negative Effects of Alcohol Use, Past 12 Months, by Pay Grade	43
12. Negative Effects of Alcohol Use, by Drinking Level	44
13. Participation in Alcohol Treatment Since Joining the Military and Negative Effects of Alcohol Use, by Drinking Level and Service	45
14. Standardized Comparisons of the Prevalence of Heavy Alcohol Use, Past 30 Days, Among Military Personnel and Civilians for Persons Aged 18 to 55	46
15. Trends in Any Illicit Drug Use, Past 30 Days and Past 12 Months, by Service, 1980-1998	50
16. Estimates of Illicit Drug Use, Past 12 Months, Unadjusted and Adjusted for Sociodemographic Differences, by Service	52
17. Any Illicit Drug Use, Past 30 Days and Past 12 Months	54
18. Demographic Correlates of Any Illicit Drug Use, Past 12 Months, Total DoD	55
19. Any Illicit Drug Use and Productivity Loss, Past 12 Months, Total DoD	58
20. Any Illicit Drug Use in Past 12 Months, by Last Time Tested for Illicit Drug Use	60
21. Any Illicit Drug Use in Past 12 Months, by Predictability of Drug Testing	61
22. Standardized Comparisons of the Prevalence of Any Illicit Drug Use, Past 30 Days, Among Military Personnel and Civilians, for Persons Aged 18 to 55	62
23. Trends in Cigarette Use, Past 30 Days, by Service, 1980-1998	66
24. Estimates of Cigarette Use, Unadjusted and Adjusted for Sociodemographic Differences, by Service	67
25. Demographic Correlates of Any Cigarette Smoking, Past 30 Days, Total DoD	69
26. Smoking Status and Smoking Cessation, Past 12 Months, by Service	71

LIST OF TABLES (continued)

Table	Page
27. Standardized Comparisons of the Prevalence of Any Cigarette Smoking Among Military Personnel and Civilians, Past 30 Days, for Persons Aged 18 to 55	72
28. Comparison of Smokeless Tobacco Use in 1995 and 1998, Past 30 Days, for All Personnel and for Males	74
29. Service Comparisons in the Prevalence of Any Cigar or Pipe Use, Past 12 Months, 1995 and 1998	75
30. Prevalence of Overweight Active-Duty Personnel, by Age and Gender	78
31. Comparison of the Prevalence of Overweight and Underweight Active-Duty Personnel, 1995 and 1998, by Gender, Using Previous Guidelines and 1998 NHLBI Guidelines	80
32. Prevalence of Underweight Active-Duty Personnel, by Age and Gender	81
33. Blood Pressure Screening and Awareness, by Selected Sociodemographic Characteristics	83
34. Seat Belt Use, by Gender and Age	86
35. Helmet Use Among Motorcyclists and Bicyclists, Past 12 Months, by Gender	87
36. Prevalence of Sexually Transmitted Disease, by Gender	88
37. Condom Use at Last Encounter Among Sexually Active Unmarried Personnel, by Selected Sociodemographic Characteristics	90
38. Levels of Perceived Stress at Work and in Family Life, Past 12 Months, by Service	94
39. Specific Sources of Stress, Past 12 Months, by Gender, Total DoD	95
40. Behaviors for Coping with Stress, by Gender, Total DoD	96
41. Need for Further Depression Evaluation, by Selected Sociodemographic Characteristics	98
42. Behavior for Coping with Stress Among Personnel in Need of Further Depression Evaluation	99
43. Stress Associated with Being a Woman in the Military, by Selected Sociodemographic Characteristics	104
44. Receipt of Prenatal Care During Most Recent Pregnancy, Past 5 Years, by Selected Sociodemographic Characteristics	106
45. Alcohol and Cigarette Use During Most Recent Pregnancy, Past 5 Years, by Service	107
46. Testicular Self-Examination Issues Among Military Men, by Service	108
47. Selected Oral Health Issues, Total DoD	110
48. Lifetime Prevalence of Gambling Problems in 1998 and 1992	113
49. Alcohol Use and Gambling Problems, Total DoD	115

LIST OF FIGURES

Figure		Page
1.	Trends in Substance Use, Past 30 Days, Total DoD, 1980-1998	20
2.	Trends in Alcohol-Related Negative Effects, by Service, 1980-1998	41

EXECUTIVE SUMMARY

This report presents the primary results of the 1998 Department of Defense (DoD) Survey of Health Related Behaviors Among Military Personnel. This study is the seventh in a series of surveys of active-duty military personnel conducted in 1980, 1982, 1985, 1988, 1992, 1995, and 1998 under the direction of the Office of the Assistant Secretary of Defense (Health Affairs). All of the surveys investigated the prevalence of alcohol use, illicit drug use, and tobacco use, as well as negative consequences associated with substance use. The 1985 through 1992 surveys also covered an expanded set of health behaviors and related issues. In 1995 and 1998, health behavior questions were revised and items were added to assess selected *Healthy People 2000* objectives. In addition, questions were added to examine the mental health of the Active Force, specific health concerns of military women and military men, oral health, and gambling behaviors.

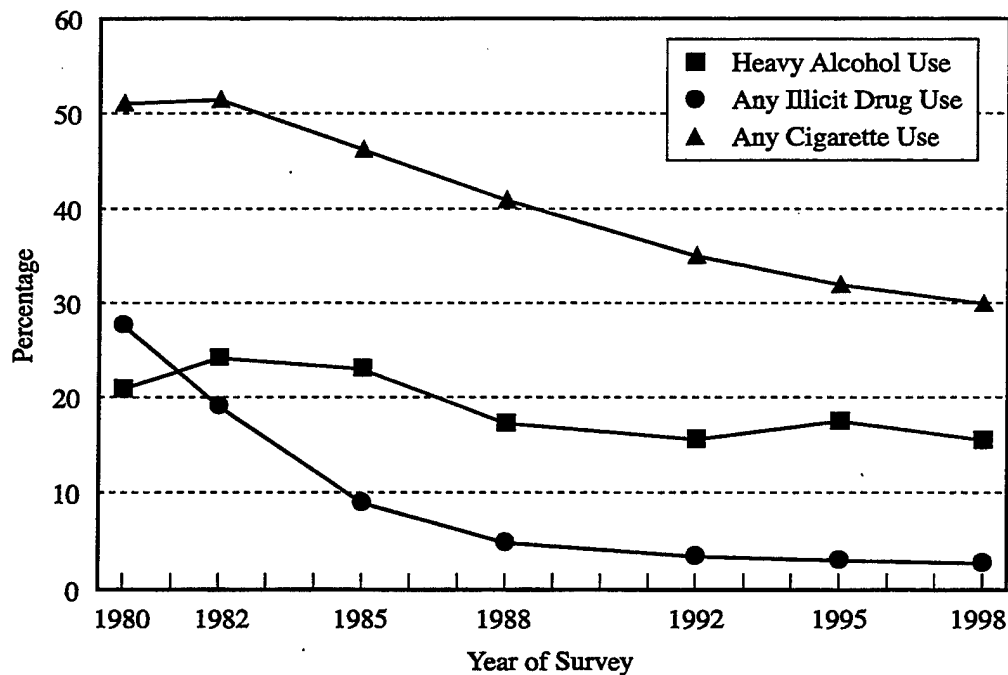
The eligible population for the 1998 survey consisted of all active-duty military personnel except recruits, Service academy students, persons absent without official leave (AWOL), and persons who had a permanent change of station (PCS) at the time of data collection. The final sample consisted of 17,264 military personnel (5,449 Army, 3,930 Navy, 3,622 Marine Corps, and 4,263 Air Force) who completed self-administered questionnaires anonymously. Participants were selected to represent men and women in all pay grades of the Active Force throughout the world. Data primarily were collected from participants in group sessions at military installations or by mail for those not attending the sessions. The overall response rate was 59%. The data were weighted to represent all active-duty personnel. Some of the key findings from the 1998 survey are noted below.

Substance Use and Negative Effects

The 1998 survey obtained data on alcohol, tobacco, and illicit drug use to assess prevalence rates of the use of these substances among military personnel. Data from the 1998 survey and prior surveys in the series were used to examine trends in use and negative effects associated with the use of these substances. In addition, comparisons were made between military and civilian data. The findings showed progress in many areas, but also identified issues in need of further attention.

- As shown in Figure ES-1, comparisons of findings across the seven surveys in the series show a significant downward trend in the use of alcohol, cigarettes, and illicit drugs. For the total DoD during the 30 days prior to the date that a survey was completed, heavy alcohol use declined from 20.8% in 1980 to 15.4% in 1998; cigarette smoking decreased from 51.0% in 1980 to 29.9% in 1998; and use of any illicit drugs declined from 27.6% in 1980 to 2.7% in 1998.

Figure ES.1 Trends in Heavy Alcohol, Cigarette, and Illicit Drug Use, 1980-1998



- Despite overall downward trends in illicit drug use, heavy alcohol use, and cigarette use since 1980, the declines for these substances were not significant between 1995 and 1998. Among the Services, only the Navy showed any significant declines in illicit drug use and heavy alcohol use between 1995 and 1998. There were no significant declines between 1995 and 1998 by any Service in rates of cigarette smoking.
- The average daily amount of alcohol (ethanol) consumed by military personnel declined from 1.48 ounces in 1980 to 0.79 ounce in 1998, a decrease of 47% in 18 years. This shift toward less use of alcohol also was evident in the increase of abstainers or light/infrequent drinkers from 25.6% in 1980 to 43.2% in 1998.
- Although there were declines in overall alcohol use, heavy alcohol use (defined as having five or more drinks per typical occasion at least once a week) remained problematic in 1998. Nearly one in six military personnel engaged in heavy alcohol use. The rate of heavy alcohol use in the Military did not decline significantly from 1988 to 1998, and the decline observed from 1980 to 1998 can be attributed largely to sociodemographic changes in the Military during that period. These results suggest that the prevention of heavy alcohol use is a topic that may need further emphasis in the Military.
- The lack of a significant decline from 1995 to 1998 in rates of cigarette smoking marks the first survey year since 1982 that smoking rates did not show a significant decrease relative to the previous survey. Although the smoking rate in 1998 was significantly lower than it was

in 1980, it remained about 10 percentage points above the *Healthy People 2000* objective of 20%.

- One of the biggest differences between the 1995 and 1998 survey findings was the increase in past year cigar or pipe smoking from 18.7% to 32.6%. Cigar or pipe smoking rates rose at least 11% for each Service. Although the vast majority of this behavior occurred infrequently (less than once a week), this large increase should be of concern to the DoD, and the use of cigars and pipes should be monitored closely in future surveys.
- Overall, 11.7% of military personnel had used smokeless tobacco in the 30 days prior to the survey, and approximately one in five had used it in the past 12 months. The rate of past month use among males aged 18 to 24 years was 19%.
- Significant declines from 1980 to 1998 were found in the percentage of military personnel experiencing alcohol-related serious consequences, productivity loss, and symptoms of alcohol dependence. Serious consequences declined from 17.3% in 1980 to 6.7% in 1998; productivity loss fell from 26.7% in 1980 to 13.6% in 1998; and symptoms of dependence went from 8.0% in 1980 to 4.8% in 1998.
- Standardized comparisons showed substantial differences between substance use patterns of military personnel and civilians (using data from the 1997 National Household Survey on Drug Abuse). After adjusting for demographic differences between Military and civilian populations, military personnel were significantly *more* likely to drink heavily than were their civilian counterparts (14.2% vs. 9.9%), but significantly *less* likely than civilians to use any illicit drugs in the past 30 days (2.6% vs. 10.7%), or to smoke cigarettes (29.1% vs. 32.8%). The lower rate of cigarette smoking among military personnel in 1998 was a first in the DoD series of surveys. The shift in the smoking pattern seems to be explained primarily by an increase in smoking among 18- to 25-year-old male civilians. The fact that a corresponding increase was not observed in the Military is encouraging.

Overall findings indicated that the Military made steady and notable progress during the 18 years from 1980 to 1998 in combating substance use and its associated problems. Despite notable progress, there still is room for considerable improvement in some areas. The DoD has made little progress in reducing heavy alcohol use and preventing cigar or pipe smoking. Cigarette smoking remained common, affecting almost one in every three active-duty military personnel; smokeless tobacco use was particularly high in men aged 24 or younger, affecting about one out of five; nearly one in three personnel had smoked a cigar or pipe in the past year; and heavy alcohol use affected nearly one in six personnel.

Progress Toward Healthy People 2000 Objectives

The 1998 DoD survey provided data for assessing selected *Healthy People 2000* objectives pertaining to rates of (a) cigarette smoking, (b) smokeless tobacco use, (c) overweight, (d) strenuous exercise, (e) blood pressure awareness, (f) blood pressure control (g) cholesterol screening, (h) injuries, (i) seat belt use, (j) helmet use, (k) condom use, (l) Pap tests, and (m) substance use during pregnancy. Table ES-1 presents a summary of progress toward these *Healthy People 2000* goals from 1995 to 1998.

- The rate of cigarette use among military personnel in 1998 (29.9%) was still considerably above the objective of reducing the prevalence of cigarette smoking to no more than 20% by the year 2000. Similarly, the prevalence of current smokeless tobacco use among young men aged 18 to 24 (19.0%) was considerably higher than the objective of 4% for males aged 24 or younger.
- Overall, military personnel in 1998 met or exceeded five of the targets examined (overweight for personnel aged 20 or older, strenuous exercise, seat belt use, Pap smears ever received, and Pap smears received in the past 3 years).
- Other *Healthy People 2000* targets had been met by at least some demographic subgroups in the Military, even if not by the entire force. For example, in the under 20 age group, the goal of no more than 15% overweight was met by women.
- Military personnel were 10 percentage points or less away from reaching the *Healthy People 2000* targets for another seven behaviors (overweight for personnel under age 20, blood pressure screening in the past 2 years, helmet use for motorcyclists and bicyclists, condom use, and no cigarette or alcohol use during pregnancy).

Thus, the Military made good progress by 1998 in a number of areas, but faces considerable challenges in meeting the targets in all areas by the year 2000. The areas where targets were met are those where military regulations help ensure compliance with the desired behaviors (weight control, exercise, seat belt use, and Pap tests). It is likely to be more challenging to reach the targets in other areas where change is more dependent on the initiative of individuals. The largest gaps and greatest challenges will be to meet the objectives for smoking, smokeless tobacco use, controlling high blood pressure, and reducing injuries that require hospitalization. The rate of cigarette smoking remained about 10% higher than the *Healthy People 2000* objective. In addition, among lifetime hypertensives, only 46.5% were taking action (i.e., taking medication, dieting, reducing salt intake, exercising) to control their blood pressure, a figure well below the objective of at least 90%. Similarly, the rate of hospitalization for injuries in the past 12 months

Table ES.1 Progress Toward Selected *Healthy People 2000* Objectives, Total DoD, 1995-1998

Characteristic/Group	Objective	Year	
		1995	1998
Cigarette smoking, past 30 days			
All personnel	≤ 20%	31.9 (0.9)	29.9 (0.8)
Smokeless tobacco use, past 30 days			
Males, aged 18 to 24	≤ 4%	21.9 (1.0)	19.0 (0.8)
Overweight—<i>Healthy People 2000</i> Guidelines			
Under age 20	≤ 15%	19.0 (1.4)	22.9 (2.0)
Aged 20 or older	≤ 20%	16.7 (0.4)	19.5 (0.5)**
Strenuous exercise, past 30 days			
All personnel	≥ 20%	65.4 (0.9)	67.7 (0.9) ^a
Blood pressure, checked past 2 years and know result			
All personnel	≥ 90%	76.3 (0.9)	80.4 (0.5)*
Taking action to control high blood pressure			
Personnel with history of high blood pressure	≥ 90%	49.3 (1.3)	46.5 (1.4)
Cholesterol checked, past 5 years			
All personnel	≥ 75%	60.1 (1.5)	62.4 (1.1)
Hospitalization for injuries, past 12 months			
All personnel	≤ 754 per 100,000	3,388 (235)	3,271 (237)
Seat belt use			
All personnel	≥ 85% of occupants	90.6 (0.7)	91.4 (0.7) ^a
Helmet use, past 12 months			
Motorcyclists	≥ 80%	71.0 (1.3)	75.9 (0.9)*
Bicyclists	≥ 50%	22.8 (1.8)	44.2 (1.7)*
Condom use at last encounter			
Sexually active unmarried personnel	≥ 50%	40.4 (1.0)	41.8 (1.0)
Pap smear			
Ever received	≥ 95%	97.1 (0.6)	97.8 (0.2) ^a
Received in past 3 years	≥ 85%	95.2 (0.7)	95.9 (0.4) ^a
Substance use during last pregnancy			
No alcohol use	≥ 88%	85.2 (1.3)	85.8 (1.2)
No cigarette use	≥ 90%	83.9 (1.4)	85.8 (1.3)

Note: Table entries are percentages (with standard errors in parentheses), except for hospitalization for injuries, which is expressed per 100,000 personnel. Definitions and referent items can be found in Tables 5 and 6.

*Comparisons between 1995 and 1998 are statistically significant at the 95% confidence level.

^aMet or exceeded *Healthy People 2000* objective.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1995-1998.

(approximately 3,300 per 100,000 personnel) was more than four times higher than the targeted rate of 754 per 100,000 personnel.

In addition to making progress toward these unmet goals, maintenance of achieved goals is required to ensure that *Healthy People 2000* objectives met in 1998 will continue to be met in subsequent years.

Mental Health, Stress, and Coping

The survey examined a variety of mental health issues among military personnel, including stress, coping mechanisms, symptoms of depression, relationships between alcohol use and mental health problems, and perceptions of the potential career impact of mental health counseling.

- Military personnel were more likely to describe their military duties as stressful than their family or personal lives. The most frequently indicated stressor for both men (19.5%) and women (19.5%) was separation from family. More men (12.9%) than women (7.8%) experienced stress due to deployment, whereas more women (17.9%) than men (13.5%) experienced stress related to changes in the family.
- Personnel who experienced higher levels of stress were more likely than those with lower stress levels to work below normal performance levels (42.6% vs. 25.4%). In addition, injuries due to accidents in the workplace were twice as common among high-stressed personnel (12.9%) than among moderate/low-stressed personnel (6.4%).
- The three most commonly used strategies for coping with stress and feelings of depression were adopting a problem-solving approach, seeking social support, and engaging in physical activity. Nearly a quarter of military personnel, however, used alcohol to cope with stress and depression.
- Rates of depressive symptomology were higher among personnel who were women, Hispanics, less educated, younger, unmarried (or married but not living with their spouse), and (for enlisted personnel only) in lower pay grades. Personnel who met the criterion for needing further depression evaluation reported higher levels of stress at work and in their family lives, and productivity loss was higher among this group than among those who did not need further evaluation. Although productive coping strategies were fairly common among those who showed depressive symptoms, it was disturbing to find that 18.3% of this group had considered suicide or self-injury as a way of coping with stress or depression.
- Heavy users of alcohol had more problems with stress, more mental health problems, and were more likely to exhibit depressive symptoms than those who did not drink. This suggests that there is a strong comorbid relationship between heavy alcohol use and mental health problems, and that this is an area in need of greater attention.

- Approximately 17% of personnel in each Service had perceived a need for mental health care in the 12 months prior to the survey, but only about half of them received this care. This may be due to the fact that personnel are unsure of the impact that mental health counseling would have on their military career.

Overall, these data indicate that most military personnel in 1998 had good mental health and appropriate coping mechanisms for managing stress. A sizable group, however, experienced problems in these areas, which suggests the need for more attention to these issues. It is important to understand these relationships, the risk factors that contribute to them, and the potential clinical, research, and policy actions that should be taken to address them in order to maximize the health and readiness of the Military.

Special Issues

The survey also investigated several other special issues that may affect the readiness of the force: (a) women's health issues, including stress associated with being a woman in the Military; (b) military men's testicular self-examination; (c) oral health; and (d) gambling, including the prevalence of problem gambling and the relationship between problem gambling and alcohol use. Overall findings suggest that several of these topics will require further attention in coming years.

- Almost one in three women reported a "great deal" or "fairly large amount" of stress associated with being a woman in the Military. Rates were higher among women who were younger, less educated, married without a spouse present, and enlisted.
- Several sociodemographic variables were related to the receipt of prenatal care. First trimester care was less likely among women who were enlisted; were unmarried; were 20 years old or younger; and had less than a college degree.
- During the 12 months prior to the survey, about one-third of military men examined their testicles for lumps at least once a month, whereas an additional one-third never had examined themselves. Findings suggested a positive relationship between education and self-care (higher rates of education about self-care were associated with higher rates of self-examination). Only about half (48%) of the men, however, had received information or instruction on testicular self-examination. This is an issue in need of further attention by the Military.
- Approximately 90% of all military personnel had received a dental check-up in the past 12 months. Among those who had *not* had a check-up, the most frequent barriers to dental care were having to wait too long at a military dental clinic before being seen (about 32%) and not liking to go to any dentist (about 31%).

- Some 8.1% of military personnel had experienced at least one of eight gambling-related problems in their lifetime, and 2.2% experienced at least three of these problems, the level constituting probable pathological gambling. The prevalence rates of gambling problems essentially were unchanged from the rate observed in 1992.
- Gambling problems were related to alcohol use. Some 15.2% of heavy drinkers had at least one problem associated with gambling in their lifetime, compared to 4.9% of abstainers. Among personnel who showed symptoms of alcohol dependence, 20.4% also had at least one gambling problem, and 8.8% could be classified as probable pathological gamblers.

Maintaining the health of the Active Force is an important factor contributing to mission readiness. The findings noted above and other related findings are discussed in greater detail in the report. The report also describes the methodologies used to develop these estimates and suggests areas in need of attention to address key health issues facing the Military as it moves to the 21st century.

1. INTRODUCTION AND BACKGROUND

In this highlights report, we present the primary findings from the 1998 Department of Defense (DoD) Survey of Health Related Behaviors Among Military Personnel, conducted by the Research Triangle Institute of Research Triangle Park, North Carolina. We describe trends in substance use since 1980, health behaviors related to selected *Healthy People 2000* objectives (Public Health Service [PHS], 1991), and progress toward achieving health-related goals set forth by the DoD. For this report, "substance use" includes use of alcohol, other drugs, and tobacco (cigarettes, smokeless tobacco, and pipes and cigars).

This study is the seventh in a series of surveys of military personnel across the world conducted in 1980, 1982, 1985, 1988, 1992, 1995, and 1998 under the guidance of the Office of the Assistant Secretary of Defense for Health Affairs or OASD (HA) (Bray et al., 1983, 1986, 1988, 1992, 1995, 1999; Burt, Biegel, Carnes, & Farley, 1980). All of the surveys have assessed the prevalence of alcohol use, drug use, and tobacco use, as well as adverse consequences associated with substance use.

Beginning in 1985, the surveys examined the effect of health behaviors other than substance use on the quality of life of military personnel. In 1988, this emphasis was expanded and oriented around the DoD health promotion objectives and provided information about knowledge of and attitudes toward the acquired immune deficiency syndrome (AIDS). In 1992, we broadened this aspect of the survey to give greater emphasis to health risks and knowledge and beliefs about AIDS transmission, and nutrition. The 1992 survey also examined several other special issues, including the impact of Operations Desert Shield and Desert Storm on substance use rates and the effects of problem gambling in the Military. In 1995, we revised the health behavior questions and added items to assess selected *Healthy People 2000* objectives, the mental health of the force, and specific health concerns of military women, including stress, pregnancy, substance use during pregnancy, and receipt of health services. In 1998, we revised some of the health behavior questions and added items to assess oral health, men's health, and gambling behavior.

1.1 Objectives of the 1998 DoD Survey

In keeping with the broad aims of the entire survey series and the health promotion focus of more recent surveys in the series, the 1998 DoD survey had two broad aims:

- continue the survey of substance use among military personnel, and
- monitor progress toward selected *Healthy People 2000* objectives.

In keeping with these two aims, the major objectives of the 1998 survey were as follows:

- continue the analysis of trends in use of alcohol, illicit drugs, and cigarettes, and consequences associated with substance use;
- describe important correlates of substance use among military personnel in 1998;
- compare rates of alcohol, illicit drug, and cigarette use among military personnel in 1998 with rates from comparable civilian populations;
- provide estimates for health behaviors pertaining to fitness and cardiovascular disease risk reduction, injuries and injury prevention, sexually transmitted disease (STD) risk reduction, cervical cancer screening, and maternal and infant health;
- identify important correlates of these health behaviors; and
- where appropriate, compare health behavior data between 1995 and 1998.

Thus, this report for the 1998 survey continues to provide estimates of the use of alcohol, illicit drugs, and cigarettes, but it gives considerable attention to health behaviors other than substance use.

1.2 Health Promotion and the Military

The current major causes of death in the United States are chronic diseases. For example, in 1996 heart disease, cancer, and stroke accounted for nearly two-thirds of the deaths in the United States. Chronic pulmonary disease and unintentional injuries were the fourth and fifth leading causes of death in the United States in 1996 (Centers for Disease Control and Prevention [CDC], 1997b). In 1997, human immunodeficiency virus (HIV) infection was the 14th leading cause of death (Department of Health and Human Services [DHHS], 1998).

Although these diseases and injuries sometimes may be caused by environmental conditions (e.g., occupational exposure to a carcinogen, such as asbestos), many of these problems are related to "lifestyle" factors, such as cigarette smoking, lack of exercise, fat and cholesterol intake, alcohol use (including driving while impaired), nonuse of seat belts, or risky sexual behaviors (e.g., not using condoms or having multiple sexual partners). More than one in four of the deaths in the United States each year can be attributed to alcohol, illicit drug, or tobacco use (Horgan, Marsden, & Larson, 1993). In particular, the Surgeon General considers tobacco use to be the single most important preventable cause of death and disease in the United States (Office on Smoking and Health, 1989).

Just as these health-related behaviors are of relevance to society in general, they also are of interest and concern to the DoD for a number of reasons. First, the health behaviors and habits that military personnel acquire or maintain during their stay in the Military either can sow the seeds for the kinds of chronic diseases described above, or reduce the risk of these diseases. Second, poor health practices among military personnel, including heavy alcohol use and illicit drug use, interfere with the DoD mission of maintaining a high state of military readiness among the Armed Forces. Third, because the defiance of laws prohibiting use of illicit drugs can have a potentially deleterious effect on military discipline, the DoD considers any use of illicit drugs by military personnel to be abuse (DoD, 1997). Finally, compared to civilians, military personnel consistently show higher rates of some negative health behaviors (e.g., heavy drinking), which indicates that members of the Armed Forces may be at increased risk for certain diseases (Bray et al., 1995). For these reasons, the DoD has placed increased emphasis on health promotion since the 1980s and more recently in the 1990s on assessing health behaviors in the Military to monitor progress toward *Healthy People 2000* objectives.

1.3 *Healthy People 2000* Objectives Examined in the 1998 DoD Survey

The purpose of *Healthy People 2000* (PHS, 1991), which identifies health objectives to be achieved by the year 2000, has been to commit the Nation to the attainment of three broad goals during the 1990s:

- increase the span of healthy life for Americans,
- reduce health disparities among Americans, and
- achieve access to preventive services for all Americans.

Specific *Healthy People 2000* objectives addressed in the 1998 DoD survey include the following:

- reduce cigarette smoking to a prevalence of no more than 20% among military personnel;
- reduce smokeless tobacco use by males aged 24 or younger to a prevalence of no more than 4%;
- reduce overweight, as measured by the Body Mass Index (BMI), to a prevalence of no more than 20% among people aged 20 or older and no more than 15% among people under age 20;
- increase to at least 20% the proportion of people aged 18 or older who engage in vigorous physical activity that promotes the development and maintenance of cardiorespiratory fitness 3 or more days per week for 20 or more minutes per occasion;

- increase to at least 90% the proportion of adults who have had their blood pressure measured within the preceding 2 years and can state whether their blood pressure was normal or high;
- increase to at least 90% the proportion of people with high blood pressure who are taking action to help control their blood pressure;
- increase to at least 75% the proportion of adults who had their blood cholesterol checked within the preceding 5 years;
- reduce nonfatal unintentional injuries that require hospitalization to no more than 754 per 100,000 people;
- increase use of occupant protection systems, such as safety belts, inflatable safety restraints, and child safety seats, to at least 85% of motor vehicle occupants;
- increase use of helmets to at least 80% of motorcyclists and at least 50% of bicyclists;
- increase to more than 50% the proportion of sexually active, unmarried people who used a condom at last sexual intercourse;
- increase to at least 95% the proportion of women aged 18 or older with intact uterine cervix who have ever received a Pap test, and to at least 85% those who received a Pap test within the preceding 1 to 3 years; and
- increase abstinence from tobacco use by pregnant women to at least 90% and increase abstinence from alcohol by at least 20%.

The 1998 DoD survey provides measures of progress for each of these *Healthy People 2000* objectives since 1995 when the last DoD survey was conducted.

1.4 Organization of the Report

This highlights report provides a chapter-by-chapter summary of the 1998 DoD survey final report (Bray et al., 1999), which describes substance use and other health behaviors among active-duty U.S. military personnel throughout the world in 1998. In Chapter 2, we summarize the general methodology for the 1998 survey. In Chapter 3, we provide an overview of trends in substance use and other health behaviors for the total DoD population, including measures related to specific *Healthy People 2000* objectives.

In the remaining chapters, we discuss survey findings in more detail, including the prevalence, trends, correlates, and comparisons with the civilian population of rates of alcohol use (Chapter 4), illicit drug use (Chapter 5), and tobacco use (Chapter 6). Chapter 6 also describes progress in meeting the *Healthy People 2000* objectives on cigarette smoking and smokeless tobacco use. In Chapter 7, we examine health behaviors and

health promotion, including behaviors related to fitness and cardiovascular disease risk reduction, injuries and injury prevention, and STD risk reduction. We also assess progress toward *Healthy People 2000* objectives in each of these areas.

In Chapters 8 and 9, we examine a number of special issues. Chapter 8 assesses levels and sources of stress, coping mechanisms, symptoms of depression, and relationships between mental health problems and alcohol use. Chapter 9 discusses military women's health, including perceived stress associated with being a woman in the Military, health behaviors related to cervical cancer screenings and pregnancy, and maternal and infant issues. In addition to women's health issues, Chapter 9 explores military men's health, as well as oral health and gambling among military personnel.

We also have included two appendices in this report. Appendix A contains a set of supplemental tables that augment data reported in the main text. Appendix B lists the DoD's survey officers who oversaw and coordinated the survey efforts at each of the participating installations.

2. METHODOLOGY OF THE 1998 DoD SURVEY

The methodology for the 1998 DoD survey was similar to that used in prior surveys in the series. In this chapter, we provide an overview of the sampling, instrumentation, and data collection procedures, as well as the key measures used, the analytical approach employed, and the rules followed to suppress unreliable estimates.

2.1 Sampling, Instrumentation, and Data Collection Procedures

The *target population* for the 1998 DoD survey included all military personnel who were on active duty at the time of data collection (April through August 1998) except for recruits, academy cadets, and persons who were absent without leave (AWOL), incarcerated, or undergoing a permanent change of station (PCS). Because of the worldwide geographic distribution of military personnel, we developed a dual-mode sampling design that called for the survey instrument to be group-administered at large installations, including aboard afloat ships (where hundreds of sample members could be assembled), and mailed to persons in smaller locations where it was not practical to conduct on-site group sessions. Approximately 88% of all active-duty personnel were stationed at military installations. The remaining 12% were mailed the survey. The sample of installations was stratified by Service, location within the continental United States (CONUS) or outside the continental United States (OCONUS), and (for the Navy) afloat designation.

The dual-mode approach to data collection allowed us to maximize the cost effectiveness of on-site data collection while retaining complete coverage of the survey population. In addition, we used stratification to control the sample distribution with respect to organizational and demographic characteristics. Similar to the design used for the 1995 DoD Survey (Bray et al., 1995), this approach allowed the sample to achieve cost efficiency while preserving inferential capability. We obtained 76% of the completed survey questionnaires from the group sessions. On average, the questionnaire required about 50 minutes to complete.

The survey instrument was a self-administered questionnaire designed for optical-mark reader scanning. The instrument contained measures of selected aspects of substance use and other health behaviors. More specifically, the questionnaire included a broad array of items about (a) the quantity, frequency, and correlates of alcohol use; (b) negative effects due to alcohol use; (c) use of cigarettes and other forms of tobacco; (d) reasons for cigarette smoking and attempts to quit; (e) nonmedical drug use; (f) health behaviors related to exercise, eating, and sleeping; (g) illnesses and medical care received; (h) use of seat belts and helmets; (i) stress experienced at work or in family life; (j) height

and weight; (k) other cardiovascular health risks, such as high blood pressure or cholesterol; (l) oral health; (m) beliefs about HIV transmission; (n) sexual practices and STDs; (o) health issues for military women; (p) health issues for military men; (q) mental health issues; (r) gambling; and (s) sociodemographic characteristics and military experience.

Table 1 presents the number of usable questionnaires for the study and the survey performance rates. As shown, usable questionnaires were obtained from 17,264 military personnel, and the overall response rate among eligibles for the study was 59.0%.

Table 1. Survey Respondents and Performance Rates

Item	Service				Total DoD
	Army	Navy	Marine Corps	Air Force	
Respondents (N)					
E1-E3	876	448	946	605	2,875
E4-E6	1,635	1,351	1,436	1,829	6,251
E7-E9	1,479	1,003	477	923	3,882
W1-W5	446	75	138	NA	659
O1-O3	508	463	323	485	1,779
O4-O10	505	590	302	421	1,818
Total	5,449	3,930	3,622	4,263	17,264
Performance Rates (%)					
Availability rate ^a	75.6	69.6	72.1	80.5	74.3
Completion rate ^b	79.5	56.3	62.9	83.9	71.3
Response rate among eligibles ^c	64.3	51.5	50.4	71.4	59.0

Note: Entries are frequencies for respondents and percentages for performance rates.

NA= Not applicable.

^aRate at which eligible persons were available to participate in group sessions. Some persons were unavailable due to illness, temporary duty assignments, and leave.

^bRate at which eligible individuals who were available took part in the survey in group sessions.

^cOverall rate at which eligible persons from both phases took part in the survey.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998.

Table 2 presents the sociodemographic characteristics of the 1998 eligible respondent population. These estimates are based on data from the sample respondents that were weighted and post-stratified to represent the eligible respondent population. This eligible respondent population (which included all active-duty personnel except recruits, Service academy students, those who were AWOL, and those who were PCS at the

Table 2. Sociodemographic Characteristics of Eligible Respondent Population

Sociodemographic Characteristic	Service				Total DoD
	Army	Navy	Marine Corps	Air Force	
Gender					
Male	85.6 (1.2)	87.5 (1.7)	94.5 (0.8)	82.5 (1.3)	86.3 (0.7)
Female	14.4 (1.2)	12.5 (1.7)	5.5 (0.8)	17.5 (1.3)	13.7 (0.7)
Race/Ethnicity					
Caucasian, non-Hispanic	56.6 (1.4)	66.4 (1.8)	62.8 (2.0)	73.2 (1.6)	64.5 (0.9)
African American, non-Hispanic	24.8 (1.5)	15.1 (1.8)	15.2 (1.2)	12.2 (1.1)	17.6 (0.8)
Hispanic	12.5 (0.9)	8.9 (0.8)	16.4 (1.9)	8.0 (0.7)	10.8 (0.5)
Other	6.1 (0.4)	9.6 (1.3)	5.6 (0.4)	6.6 (0.6)	7.1 (0.4)
Education					
High school or less	30.7 (1.9)	37.0 (2.6)	52.8 (3.0)	17.3 (1.8)	31.3 (1.2)
Some college	47.0 (1.0)	41.8 (1.5)	34.5 (1.9)	54.9 (2.6)	46.3 (1.0)
College degree or beyond	22.3 (1.4)	21.3 (3.2)	12.7 (2.0)	27.8 (3.7)	22.4 (1.4)
Age					
20 or younger	12.3 (1.0)	5.8 (1.2)	20.0 (2.0)	7.3 (0.9)	10.2 (0.6)
21-25	31.3 (1.6)	24.5 (1.6)	40.0 (2.9)	23.5 (1.3)	28.4 (0.9)
26-34	33.1 (1.2)	38.5 (1.2)	23.7 (2.2)	36.8 (0.8)	34.4 (0.7)
35 or older	23.3 (1.8)	31.2 (1.9)	16.3 (1.9)	32.4 (1.7)	27.0 (1.0)
Family Status^a					
Not married	40.8 (1.1)	38.6 (1.5)	50.1 (2.1)	35.5 (1.1)	39.9 (0.7)
Married	59.2 (1.1)	61.4 (1.5)	49.9 (2.1)	64.5 (1.1)	60.1 (0.7)
Married, spouse not present	9.3 (1.8)	4.6 (0.5)	5.9 (0.5)	4.2 (2.1)	6.2 (0.9)
Married, spouse present	49.9 (2.7)	56.8 (1.7)	44.0 (2.3)	60.2 (2.9)	53.9 (1.4)
Pay Grade					
E1-E3	18.5 (1.2)	14.1 (1.6)	34.9 (3.8)	16.7 (1.7)	18.9 (0.9)
E4-E6	51.1 (1.3)	58.7 (2.8)	45.0 (2.5)	51.7 (2.7)	52.5 (1.2)
E7-E9	11.5 (1.0)	10.4 (0.8)	8.6 (0.9)	11.4 (0.7)	10.8 (0.4)
W1-W5	2.6 (0.4)	0.6 (0.1)	1.3 (0.1)	NA (NA)	1.2 (0.1)
O1-O3	9.2 (0.7)	9.7 (1.5)	6.0 (1.3)	11.2 (2.2)	9.5 (0.8)
O4-O10	7.2 (0.7)	6.6 (1.5)	4.2 (1.1)	9.0 (1.8)	7.2 (0.7)
Total Personnel	34.0 (1.5)	25.8 (1.7)	12.2 (1.1)	28.0 (1.3)	100.0 (NA)

Note: Table entries are column percentages (with standard errors in parentheses).

NA = Not applicable.

^aEstimates of family status in 1998 are not strictly comparable to those from other survey years. In 1998, personnel who reported that they were living as married were classified in the "not married" group. In prior years, the marital status question did not distinguish between personnel who were married and those who were living as married.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (refer to Section 2.2 for descriptions of sociodemographic variables).

time of data collection) accounted for 84% of all active-duty personnel. Because the eligible respondent population omitted some personnel, its characteristics may differ somewhat from those of the total Active Force, although any fluctuations are expected to be relatively small. As shown in Table 2, the majority of personnel were males (86.3%), white (64.5%), educated beyond high school (68.7%), age 34 or younger (73.0%), married (60.1%), and in pay grades E1 to E6 (71.4%). Table 2 also shows some notable differences among the Services. The most striking contrasts occurred between Marine Corps and Air Force personnel. Compared to Air Force personnel, those in the Marine Corps were more likely to be male, to be educated only through high school, to be age 25 or younger, to be unmarried, and to be in pay grades E1 to E3.

2.2 Key Measures

Measurement for the 1998 study focused on the prevalence and correlates of substance use and abuse, negative effects of alcohol use, other health behaviors, and mental health. We measured alcohol use in terms of the quantity of alcohol consumed and frequency of drinking. We expressed alcohol use in summary form as the average number of ounces of absolute alcohol (ethanol) consumed per day and as drinking levels. The ethanol index is a function of (a) the amount of ethanol contained in the ounces of beer, wine, and hard liquor consumed on a typical drinking day during the past 30 days; (b) the frequency of use of each beverage; and (c) the amount of ethanol consumed on atypical ("heavy") drinking days during the past 12 months. The index represents average daily ounces of ethanol consumed during a 12-month period.

The drinking-level classification defined five drinking-level groups (abstainers, infrequent/light, moderate, moderate/heavy, and heavy drinkers) based on quantity and frequency data during the past 30 days for the respondent's primary beverage. Abstainers drank once a year or less. Those in the infrequent/light category drank one to three times a month and consumed one to four drinks per typical drinking occasion. Those in the moderate category drank (a) at least once a week with one drink per typical drinking occasion, (b) two to three times a month with two to four drinks per typical occasion, or (c) once a month or less with five or more drinks per typical occasion. Those in the moderate/heavy category drank at least once a week with two to four drinks per typical drinking occasion or two to three times per month with five or more drinks per typical occasion. Those in the heavy category drank at least once a week with five or more drinks per typical drinking occasion.

There was a slight change in the calculation of the ethanol index and the drinking-level measures in the 1998 DoD survey relative to that used in earlier DoD surveys. Specifically, the algorithm for calculating these measures was modified slightly to take into account information about consumption of beer in 32-ounce containers in the 1985 to 1995

surveys and consumption of beer in 32- and 40-ounce containers in the 1998 survey. No changes were made to the algorithm for the 1980 and 1982 surveys because the survey questionnaire did not ask about these larger-size beer containers. Thus, the trend data presented for ethanol and drinking levels show slightly different estimates from those presented in prior reports. Tables A.5 through A.10 in Appendix A compare estimates for these measures using the two different calculation procedures of including or not including the larger beer containers.

We also estimated the prevalence of adverse effects associated with alcohol use in the past 12 months. We created three summary measures of alcohol-related negative effects: serious consequences, productivity loss, and symptoms of dependence. The measure of alcohol-related "serious consequences" refers to the occurrence of one or more of the following problems in the past 12 months: (a) being passed over for promotion because of drinking; (b) loss of 1 week or more from duty because of a drinking-related illness; (c) UCMJ (Uniform Code of Military Justice) punishment because of drinking; (d) arrests for DWI (driving while impaired); (e) alcohol-related arrests other than DWI; (f) alcohol-related incarceration; (g) physical fights while drinking; (h) spouse left because of drinking; (i) need for alcohol detoxification; and (j) loss of 3 or more work days because of drinking (for any reason).

The measure of alcohol-related "productivity loss" refers to one or more occurrences in the past 12 months of (a) being late for work or leaving early because of drinking, a hangover, or a drinking-related illness; (b) not coming to work at all because of a hangover, a drinking-related illness, or a drinking-related injury; (c) performing below a normal level of productivity because of drinking, a hangover, or a drinking-related illness; or (d) being drunk at work.

The summary measure of symptoms of alcohol dependence was based on the occurrence in the past 12 months of (a) withdrawal symptoms (e.g., hands shaking because of drinking or having the "shakes"), (b) the inability to recall things that happened while drinking, (c) the inability to stop drinking before becoming drunk, and (d) morning drinking. Respondents reported the number of days that they experienced these symptoms during the past 12 months, and we summed these frequencies over the four symptoms. Individuals with scores of 48 or higher were classified as dependent. Our measure of dependence symptoms is based on the Rand Air Force study definition (Polich & Orvis, 1979) that has been used in prior surveys in the DoD survey series. This definition does not reflect the strict definition of dependence used in the *Diagnostic and Statistical Manual of Mental Disorders (DSM-IV)* (American Psychiatric Association [APA], 1994), but it was used here to permit comparisons with data from prior surveys in this DoD series.

We measured illicit drug use in this study in terms of the prevalence of nonmedical use of any of 12 categories of drugs: marijuana/hashish, phencyclidine (PCP), lysergic acid diethylamide (LSD) or other hallucinogens, cocaine, amphetamines or other stimulants, tranquilizers or other depressants, barbiturates or other sedatives, heroin or other opiates, analgesics or other narcotics, inhalants, designer drugs, and anabolic steroids. We made no attempt to measure quantity (e.g., number of pills) or the size of doses because most respondents cannot furnish this information adequately and because of the considerable variation in "street" drug purity.

To estimate the prevalence of use, we included questions about use of each drug type within the past 30 days and within the past 12 months. In addition, we created indices for estimating the prevalence of use of any illicit drug (omitting steroids) and any drug besides marijuana (omitting steroids). Definitions followed those used in prior DoD surveys to facilitate comparisons. These definitions also have been used in recent waves of the NHSDA (e.g., Office of Applied Studies [OAS], 1998a, in press). We constructed indices of any drug use and any drug use except marijuana by creating use/no use dichotomies for each drug category and then setting an individual's score to the maximum score value of the categories that we included (i.e., all, or all but the marijuana category).

Most analyses of tobacco focus on cigarette smoking. We defined "current smokers" as those who smoked at least 100 cigarettes during their lifetime and who last smoked a cigarette during the past 30 days. We defined "heavy smokers" as current smokers who smoked one or more packs of cigarettes per day. In some analyses, we also classified personnel in terms of whether they were lifetime smokers (i.e., smoked at least 100 cigarettes in their lifetime, but did not smoke in the past 30 days) or nonsmokers (smoked fewer than 100 cigarettes lifetime).

The 1998 survey also measured the prevalence of use of other forms of tobacco besides cigarettes (cigars, pipes, smokeless tobacco). "Current" users of smokeless tobacco were defined as personnel who used smokeless tobacco products (i.e., chewing tobacco or snuff) at least 20 times during their lifetime and who last used smokeless tobacco during the past 30 days. Pipe and cigar use was defined as smoking one or more times during the past 30 days.

To monitor progress toward *Healthy People 2000* objectives (PHS, 1991), we measured the following health behaviors or factors: (a) overweight and exercise; (b) high blood pressure screening and action; (c) high cholesterol screening and action; (d) hospitalization for injuries; (e) seat belt use; (f) motorcycle and bicycle helmet use; (g) condom use by sexually active unmarried personnel; (h) women's receipt of Pap smears; and (i) substance use during pregnancy. Except for overweight, measures for the other

health behaviors were based primarily on responses to specific questions about the behavior and generally did not involve the construction of special indexes.

The *Healthy People 2000* objective for hospitalization for injuries refers specifically to unintentional injuries. The 1995 and 1998 DoD survey measure of hospitalization for injuries does not distinguish between unintentional injuries and intentional injuries. Intentional injuries are those that result from deliberate intent to harm an individual or oneself (e.g., assault, suicide) and differ from injuries that result from other agents or events (e.g., running injury, motor vehicle crash). To have examined the distinction between unintentional and intentional injuries in the survey would have required the addition of a series of questions and skip patterns. Due to space limitations and the expectation that few injuries experienced by military personnel would be intentional injuries, we asked just about the overall rate of injuries. This difference between the survey measure of hospitalization for any injuries and the *Healthy People 2000* objective is discussed further in Chapters 3 and 7.

We defined an index of overweight in terms of the Body Mass Index (BMI), where BMI is weight (in kilograms) divided by the square of height (in meters). Using the BMI criteria from *Healthy People 2000*, we defined military men as overweight if they were under age 20 and had a BMI of 25.8 or greater, or if they were aged 20 or older and had a BMI of 27.8 or greater. We defined military women as overweight by *Healthy People 2000* criteria if they were under age 20 and had a BMI of 25.7 or greater, or were aged 20 or older and had a BMI of 27.3 or greater (PHS, 1991).

During the summer of 1998, the National Heart, Lung, and Blood Institute (NHLBI) developed new BMI guidelines for overweight and underweight. These guidelines defined four levels of overweight, regardless of age or gender: (a) overweight—BMI of 25.0 to 29.9; (b) obesity I—BMI of 30.0 to 34.9; (c) obesity II—BMI of 35.0 to 39.9; and (d) extreme obesity—BMI 40.0 or greater. Underweight was defined as BMI less than 18.5 for both men and women regardless of age (NHLBI, 1998). Even though the DoD has not adopted the NHLBI guidelines, we conducted selected analyses using these BMI criteria to allow the Military to assess the potential implications of adopting such guidelines. For these analyses, we combined the four NHLBI overweight categories into a single category and classified military personnel as overweight for BMI of 25.0 or greater.

The 1998 DoD survey contained questions on mental health issues, including (a) levels of stress at work and in family life, (b) sources of stress, (c) behaviors for coping with stress, (d) perceived quality of mental health, (e) symptoms of depression, (f) receipt and source of mental health services in the past 12 months, (g) perceived need for mental health serviced in the past 12 months, and (h) perceived damage to one's military career associated with seeking mental health services. Measures for most of these items were

based on responses to specific questions. In addition, an index of Need for Further Assessment for Depression was constructed based on reports of an extended period of depression, primarily in the past 12 months. Personnel were defined as needing further assessment if they (a) felt sad, blue, or depressed for 2 weeks or more in the past 12 months, or reported 2 or more years in their lifetime of feeling depressed and felt depressed "much of the time" in the past 12 months; *and* (b) felt depressed on 1 or more days in the past week. This index was based on work by Rost, Burnam, and Smith (1993).

Respondents in the 1998 survey also were asked a series of eight questions about gambling to assess the lifetime prevalence of gambling problems and the lifetime prevalence of pathological gambling in the Military. Specifically, respondents were asked whether they had ever had any of the following gambling-related problems: (a) being increasingly preoccupied with gambling; (b) needing to gamble with increased amounts of money to achieve the desired level of excitement; (c) feeling restless or irritable when unable to gamble; (d) gambling to escape from problems; (e) going back to try to win back earlier gambling losses; (f) lying to others about the extent of their gambling; (g) having jeopardized or lost important relationships, a job, or career opportunities because of gambling; and (h) borrowing money to relieve financial problems caused by gambling. An affirmative answer to *at least one* of the above items was considered to be indicative of problem gambling at some point in a person's life, but not necessarily pathological gambling. Answering affirmatively to *three or more* problem items was considered to indicate probable pathological gambling.

2.3 Analytical Approach

The focus of our analyses of the 1998 DoD survey was to provide knowledge about current levels of substance use and health behaviors, negative effects associated with alcohol use, and trends in these behaviors throughout the survey series. In addition, analyses provide baseline estimates of selected *Healthy People 2000* objectives and other selected behaviors of interest. These analyses provide information to help assess and guide policy and program directions, including the most effective targeting of resources to problem areas.

To accomplish these aims, we conducted five basic types of analyses within this study:

- descriptive univariate and bivariate analyses of the prevalence of substance use, negative consequences, health behaviors, selected *Healthy People 2000* objectives in 1998, and gambling behaviors;
- comparisons of trends in substance use and negative effects from 1980 to 1998 (including standardized comparisons of substance use to control for changes in demographic composition);

- standardized comparisons of the extent of substance use among personnel in the four active Services in 1998;
- standardized comparisons of military and civilian rates of substance use; and
- multivariate logistic regression analyses.

Most of our analyses were descriptive cross-tabulations of the responses from two or more variables. We assessed significant differences for these data using *t* tests.

An important part of our analyses included the comparison of trends across the series of DoD surveys. Comparing substance use over time is useful, but researchers and policymakers should recognize the limitations of such analyses in drawing policy conclusions. Many individuals serving in the Military between 1980 and 1995 (the period during which the other DoD surveys were administered) were no longer in the Military in 1998. Thus, analysts must use caution in making inferences about reasons for the observed changes in rates of substance use, health behaviors, or problems. The changes may be due, in part, to effective substance use and health promotion programs and other health-related policies in the Military, but they also may be due, in part, to differences in sociodemographic characteristics, attitudes, and values of the populations being surveyed.

To control for these differences in DoD composition over time, we used direct standardization techniques (Kalton, 1968) to statistically adjust for differences in demographic characteristics of personnel across the DoD surveys, among the Services, and among civilian populations. More specifically, across survey years we used standardization techniques to create adjusted estimates of heavy use of alcohol, use of illicit drugs, and use of cigarettes, as though the military population in each survey had the same age, educational, and marital status distribution as in 1980. Although these adjusted estimates were constructed estimates, they allowed us to determine whether observed changes in substance use rates from 1980 to 1998 can be explained by changes in the demographic composition of the Services.

When examining substance use among the Services, we also computed unadjusted and adjusted estimates. Unadjusted rates indicate the challenge facing each Service in its efforts to prevent and reduce heavy drinking, illicit drug use, and smoking, but do not allow strict comparison across Services. Comparisons of efforts by the Services to combat substance abuse must consider demographic differences in risk factors. We used direct standardization procedures to adjust the 1998 prevalence rates for each Service to construct the rates that would be expected if each Service had the gender, age, education, race/ethnicity, and marital status distribution of the total DoD.

In addition to standardizations that examined trends and Service differences, we also conducted standardized comparisons to assess similarities in substance use rates of military and civilian populations. In these analyses, we standardized the civilian data to match the demographic distribution of the Military and then computed new civilian rates for the standardized population. These standardized comparisons also used the technique of direct standardization.

Finally, we used logistic regression analyses in Chapter 4 (alcohol use), Chapter 5 (illicit drug use), and Chapter 6 (tobacco use) to model outcome measures of heavy drinking, illicit drug use, and cigarette smoking as a function of demographic variables. In logistic regression, the natural log of the odds (i.e., $\ln p/1-p$) is modeled as a linear function of the independent variables. The parameters of a logistic regression model are transformed to reflect relative changes in the odds due to changes in the independent variables.

We describe the details of these statistical procedures in the project final report (Bray et al., 1999). Taken together, these analyses provide information to help assess and guide policy and program directions, including the most effective allocation of resources to problem areas.

2.4 Variability and Suppression of Estimates

Table 2 and other tables in the following chapters generally present two numbers in each cell. The first number is an estimate of the percentage of the population with the characteristics that define the cell. The second number, in parentheses, is the standard error of the estimate. Standard errors represent the degree of variation associated with observing a sample rather than observing every member of the population.

In this report, we omitted estimates that were considered to be unreliable. More specifically, we suppressed estimates of means and proportions that could not be reported with confidence because they either were based on small sample sizes ($n < 30$) or had large sampling errors. We used two rules to suppress estimates with large sampling errors, one for means and one for proportions.

For estimates expressed as means (e.g., average ounces of ethanol), we also suppressed estimates with relative standard errors (*RSEs*) greater than 50% of the estimate. The *RSE* is computed by dividing the standard error of the estimate by the estimate. For estimates expressed as proportions (e.g., the proportion of heavy drinkers), we used a suppression rule based on the *RSE* of the natural log of the estimated proportion (p). Specifically, we suppressed estimates in tables and figures when

$$RSE [-\ln(p)] > 0.225 \text{ for } p \leq 0.5, \text{ and}$$

$RSE [-\ln(1-p)] > 0.225$ for $p > 0.5$.

Note that $RSE[-\ln(p)] = RSE(p)/(-\ln(p)) = SE(p)/(-p \ln(p))$, where $SE(p)$ denotes the standard error of p , the estimated proportion.

Unreliable estimates that were omitted are noted by a "+" in the tables. Very small estimates (i.e., $<0.05\%$) that were not suppressed by the rules, but that rounded to zero, also were omitted from the tables and are shown as two asterisks (**).

3. OVERVIEW OF TRENDS IN SUBSTANCE USE AND HEALTHY PEOPLE 2000 OBJECTIVES

In this chapter, we briefly review the prevalence of alcohol use, illicit drug use, and tobacco use from the 1998 DoD survey and examine trends in substance use and negative effects due to alcohol use from 1980 to 1998. We also provide data for selected *Healthy People 2000* objectives for military personnel, many of which apply to all personnel and several that are specific to military women. Our focus is on data for the entire DoD. Later chapters consider these findings both for the total DoD and the individual Services.

3.1 Trends in Substance Use

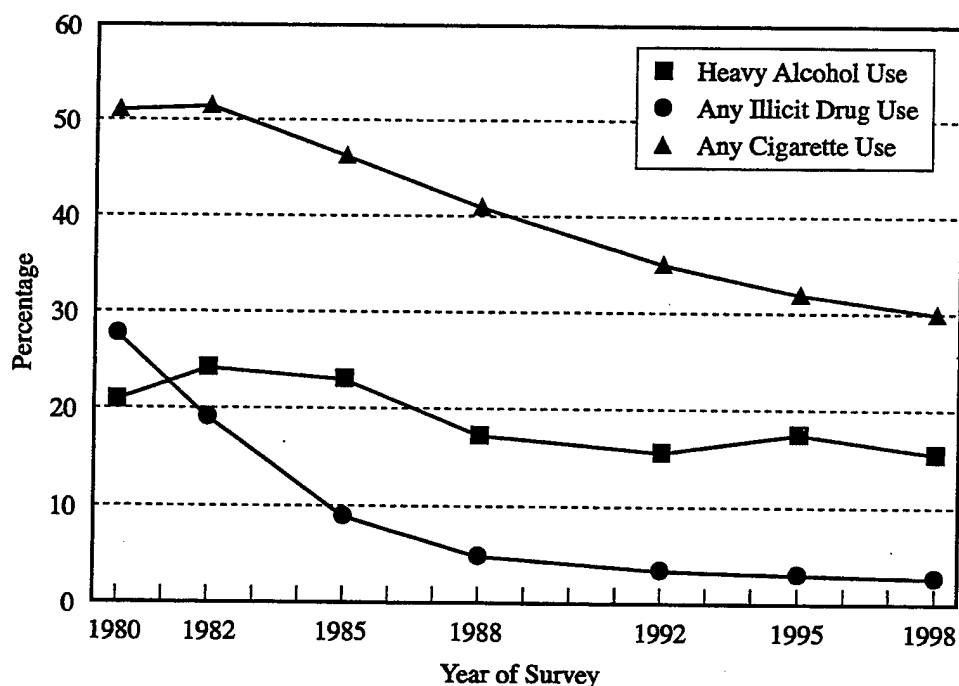
In this section, we present two types of estimates, unadjusted and adjusted prevalence rates. Unadjusted rates are those observed in the DoD survey series from 1980 to 1998 and reflect the circumstances facing the Services in reducing substance use. Adjusted rates, on the other hand, have been modified to take into account changes in the sociodemographic composition of the Services since the survey series began in 1980. Adjusted rates help address the question of whether changes reflected in the trends in substance use are due primarily to shifts in military demographics.

3.1.1 Unadjusted Trends in Substance Use

Figure 1 presents the trends over the seven DoD surveys of the percentage of the total Active Force during the past 30 days who engaged in heavy alcohol use, any illicit drug use, and any cigarette use. Table 3 presents the observed rates of use of the three substances for the seven survey years and information about the statistical significance of changes in substance use between each pair of survey years. In addition, Table 3 shows the distribution of alcohol use among drinking levels across the survey years.

As noted in Section 2.1, we made a slight change in 1998 to the calculation of the drinking-level measure relative to earlier surveys. The algorithm was modified to take into account information about consumption of beer in 32-ounce containers in the 1985 to 1995 surveys and consumption of beer in 32- and 40-ounce containers in the 1998 survey. No changes were made to the algorithm for the 1980 and 1982 surveys because the survey questionnaire for these years did not ask about these larger-sized beer containers. Thus, the trend data presented in Figure 1 and Table 3 for drinking levels show slightly different estimates from those presented in prior reports. Tables A.5 through A.10 compare estimates using the two different calculation procedures of including or not including the larger beer containers. As shown in these appendix tables, the changes are fairly small and do not alter the pattern of results observed with the prior algorithm. They do result,

Figure 1. Trends in Substance Use, Past 30 Days, Total DoD, 1980-1998



Note: Definitions and measures of substance use are given in Section 2.2. The algorithm for computing drinking levels (including heavy alcohol use) was altered for this report as follows: Estimates for heavy alcohol use for 1998 take into account both 32-ounce or liter and 40-ounce size containers. Estimates for heavy alcohol use for 1985 to 1995 take into account 32-ounce or liter containers, but not 40-ounce containers. Therefore, 1985 to 1995 heavy alcohol use estimates differ slightly from those reported in previous DoD survey reports. Tables A.5 through A.9 compare drinking-level estimates for 1985 to 1998 based on the algorithm used in previous reports and the algorithm used in this report.

Source: DoD Surveys of Health Related Behaviors Among Military Personnel, 1980 to 1998 (1998 Questions: Heavy Alcohol Use, Q15-18 and 20-23; Any Illicit Drug Use, Q60 and 67; Any Cigarette Smoking, Q44 and 47)..

however, in slightly higher prevalence estimates (0.1 to 0.3 percentage point increase) of heavy alcohol use when the data from the larger containers are included. We have shifted to the new estimates because they provide a more comprehensive view of drinking behavior in the Military.

Comparisons of findings from seven DoD surveys of military personnel conducted in 1980, 1982, 1985, 1988, 1992, 1995, and 1998 show a downward trend in the use of alcohol, illicit drugs, and cigarettes (Table 3 and Figure 1). Specifically, focusing on past 30-day substance use for the total DoD,

- heavy alcohol use declined significantly from 20.8% in 1980 to 15.4% in 1998;

Table 3. Substance Use Summary for Total DoD, 1980-1998

Measure	Year of Survey					
	1980	1982	1985	1988	1992	1995
Alcohol Drinking Levels						
Abstainer	13.5 (0.5)	11.8 (0.5) ^a	13.3 (0.6) ^a	17.2 (0.4) ^a	20.0 (0.8) ^a	20.7 (0.5)
Infrequent/light	12.1 (0.4)	17.6 (0.8) ^a	16.5 (0.7)	17.5 (0.5)	18.5 (0.4)	18.5 (0.6)
Moderate	21.2 (0.7)	17.0 (0.5) ^a	18.7 (0.6) ^a	19.4 (0.5)	19.6 (0.5)	19.0 (0.5)
Moderate/heavy	32.4 (0.6)	29.6 (0.6) ^a	28.5 (0.8)	28.8 (0.7)	26.3 (0.6) ^a	24.5 (0.6) ^a
Heavy	20.8 (1.1)	24.1 (1.0) ^a	23.0 (1.1)	17.2 (0.9) ^a	15.5 (0.8)	17.4 (0.9)
Any Illicit Drug Use						
Past 30 days	27.6 (1.5)	19.0 (1.0) ^a	8.9 (0.8) ^a	4.8 (0.3) ^a	3.4 (0.4) ^a	3.0 (0.3)
Past 12 months	36.7 (1.5)	26.6 (1.0) ^a	13.4 (1.0) ^a	8.9 (0.8) ^a	6.2 (0.6) ^a	6.5 (0.5)
Cigarette Use, Past 30 Days						
Any smoking	51.0 (0.8)	51.4 (0.8)	46.2 (1.0) ^a	40.9 (0.8) ^a	35.0 (1.0) ^a	31.9 (0.9) ^a
Heavy smoking	34.2 (0.6)	33.5 (0.7)	31.2 (0.8) ^a	22.7 (0.7) ^a	18.0 (0.5) ^a	15.0 (0.6) ^a
Alcohol Use Negative Effects, Past 12 Months						
Serious consequences	17.3 (1.1)	14.6 (0.6) ^a	10.7 (0.9) ^a	9.0 (0.6)	7.6 (1.1)	7.6 (0.5)
Productivity loss	26.7 (1.2)	34.4 (0.7) ^a	27.1 (1.1) ^a	22.1 (1.2) ^a	16.4 (1.4) ^a	16.3 (0.8)
Dependence	8.0 (0.6)	9.0 (0.5)	7.7 (0.7)	6.4 (0.5)	5.2 (0.4)	5.7 (0.4)

Note: Table entries are percentages (with standard errors in parentheses). Significance tests were done between consecutive survey years (e.g., 1980 and 1982) and between 1980 and 1998. Definitions and measures of substance use are given in Section 2.2. The algorithm for computing drinking levels was altered for this report as follows: Estimates for drinking levels for 1998 take into account both 32-ounce or liter and 40-ounce size containers. Estimates for drinking levels for 1985 to 1995 take into account 32-ounce or liter containers, but not 40-ounce containers. Therefore, 1985 to 1995 drinking-level estimates differ slightly from those reported in previous DoD survey reports. Tables A.5 through A.9 compare drinking-level estimates for 1985 to 1998 based on the algorithm used in previous reports and the algorithm used in this report.

^aComparisons between this survey and the preceding survey are statistically significant at the 95% confidence level.

^bComparisons between 1980 and 1998 are statistically significant at the 95% confidence level.

Source: DoD Surveys of Health Related Behaviors Among Military Personnel, 1980 to 1998 (1998 Questions: Alcohol Drinking Levels, Q15-18 and 20-23; Any Illicit Drug Use: Past 30 Days, Q60 and 67, Past 12 Months, Q60-61 and 67; Cigarette Use, Past 30 Days: Any Smoking, Q44 and 47, Heavy Smoking, Q45; Alcohol Use Negative Effects, Past 12 Months: Serious Consequences, Q34 and 36, Productivity Loss, Q32A-F, Dependence, Q33A-C and E-F).

- use of any illicit drugs declined sharply from 27.6% in 1980 to 2.7% in 1998; and
- cigarette smoking decreased significantly from 51.0% in 1980 to 29.9% in 1998.

In addition, the data showed a general shift toward less use of alcohol. The percentage of people who abstained from alcohol or who were infrequent/light drinkers increased significantly from 25.6% in 1980 to 43.2% in 1998.

Comparisons of findings between the 1995 and 1998 surveys show no significant changes in the rates of heavy alcohol use, illicit drug use, or cigarette smoking. The finding of no significant decline from 1995 to 1998 in heavy alcohol use suggests that this is an area that may need greater emphasis by the Military. Indeed, the 1998 rate of heavy alcohol use had not changed significantly over the past decade from the 1988 rate. Despite the findings for the DoD as a whole, as is discussed later, the Navy did show significant declines in illicit drug use and heavy alcohol use between 1995 and 1998. Increased efforts on the part of the Navy to combat alcohol and illicit drug use may have had an impact on declines in use.

The finding of no significant reduction in illicit drug use between 1995 and 1998 and the relatively low rates of use for both surveys suggests that illicit drug use may have reached its lower limit. It may be unrealistic to expect drug use rates to go much lower. The finding that smoking did not decline significantly between 1995 and 1998 marks the first survey year since 1982 when smoking rates did not show a significant decrease from the prior survey. Despite clear progress in reducing the prevalence of cigarette smoking, the 1998 rate remained 10 percentage points higher than the *Healthy People 2000* objective of 20%.

3.1.2 Trends in Substance Use Adjusted for Changes in Sociodemographic Composition

Members of the Armed Forces in 1998 were more likely to be older, to be officers, to be married, and to have more education than in 1980—factors that also are associated with less substance use. To examine whether changes in demographic composition explained declines in substance use across survey years, we standardized or adjusted rates of use for all surveys since 1982 to the age/education/marital status distribution for the 1980 survey. Adjusted (standardized) rates are not actual prevalence estimates, but rather are constructed estimates that show how the rates would have looked had there been no changes in the demographic characteristics of the Military from 1980 to 1998.

Table 4 presents the unadjusted and adjusted rates for heavy alcohol use, illicit drug use, and cigarette use for the total DoD across the seven surveys:

- A key finding for heavy alcohol use is that the significant decline from 1980 to 1998 for unadjusted rates was not significant for the adjusted rates. This suggests that the decline in heavy alcohol use observed in the unadjusted rates can be largely explained by the changes in the demographics of the Military over the period from 1980 to 1998.
- For illicit drug use and cigarette smoking, adjusted data showed the same strong significant downward trend in use as the unadjusted data between 1980 and 1998. This indicates that the declines in use between surveys were not explained by shifts in the sociodemographic composition of the military population.

The implication of the finding of no difference in adjusted rates for heavy alcohol use is that military programs and practices had little effect on rates of heavy alcohol use during the 18-year period. This conclusion is subject to other interpretations, however. Both the adjusted and unadjusted data showed a significant increase in heavy alcohol use between 1980 and 1982, and adjusted data were significantly lower in 1998 than in 1982 (significance test not shown). This could be interpreted to mean that the Military made significant progress in reducing heavy alcohol use during the period, from 23.6% in 1982 to 19.3% in 1998 (adjusted rates), that cannot be explained just by demographic changes. Another view consistent with historical events is that the 1982 increase in heavy alcohol use is an anomaly that may reflect substitution to alcohol when the initial crackdown on illicit drug use began. This notion suggests that rates of heavy alcohol use merely fluctuated around a base level observed in 1980. In either case, the adjusted data indicate that when demographics of the Military were considered, rates of heavy alcohol use in 1998 were about the same as they were in 1980.

3.1.3 Trends in Alcohol-Related Negative Effects

The negative implications of alcohol use on the health, work performance, and social relationships of military personnel continue to be evaluated. Notably, significant declines were found in the percentage of military personnel experiencing alcohol-related serious consequences, productivity loss, and symptoms of dependence across the survey years. Table 3 presents trends in alcohol-related negative effects for the military population as a whole from 1980 to 1998:

- serious consequences significantly declined from 17.3% in 1980 to 6.7% in 1998;
- productivity loss declined significantly from 26.7% in 1980 to 13.6% in 1998; and

Table 4. Trends in Substance Use, Past 30 Days, Unadjusted and Adjusted for Sociodemographic Characteristics for Total DoD, 1980-1998

Substance/Type of Estimate	Year of Survey						
	1980	1982	1985	1988	1992	1995	1998
Heavy Alcohol Use							
Unadjusted	20.8 (1.1)	24.1 (1.0) ^a	23.0 (1.1)	17.2 (0.9) ^a	15.5 (0.8)	17.4 (0.9)	15.4 (0.8) ^c
Adjusted ^b	20.8 (1.1)	23.6 (0.9) ^a	24.8 (0.9)	20.1 (1.1) ^a	19.1 (1.2)	20.5 (0.8)	19.3 (0.9)
Any Illicit Drug Use							
Unadjusted	27.6 (1.5)	19.0 (1.0) ^a	8.9 (0.8) ^a	4.8 (0.3) ^a	3.4 (0.4) ^a	3.0 (0.3)	2.7 (0.3) ^c
Adjusted ^b	27.6 (1.5)	18.2 (0.7) ^a	9.7 (0.6) ^a	5.6 (0.4) ^a	4.3 (0.6)	3.6 (0.4)	4.1 (0.4) ^c
Cigarette Use							
Unadjusted	51.0 (0.8)	51.4 (0.8)	46.2 (1.0) ^a	40.9 (0.8) ^a	35.0 (1.0) ^a	31.9 (0.9) ^a	29.9 (0.8) ^c
Adjusted ^b	51.0 (0.8)	52.0 (0.6)	47.5 (0.9) ^a	42.9 (0.7) ^a	37.2 (0.8) ^a	34.3 (0.6) ^a	33.8 (0.7) ^c

Note: Table entries are percentages (with standard errors in parentheses). Significance tests were done between consecutive survey years (e.g., unadjusted estimates between 1980 and 1982; adjusted estimates between 1980 and 1982) and between 1980 and 1998. Definitions and measures of substance use are given in Section 2.2. The algorithm for computing drinking levels (including heavy alcohol use) was altered for this report as follows: Estimates for heavy alcohol use for 1998 take into account both 32-ounce or liter and 40-ounce size containers. Estimates for heavy alcohol use for 1985 to 1995 take into account 32-ounce or liter containers, but not 40-ounce containers. Therefore, 1985 to 1995 heavy alcohol use estimates differ slightly from those reported in previous DoD survey reports. Tables A.5 through A.9 compare drinking-level estimates for 1985 to 1998 based on the algorithm used in previous reports and the algorithm used in this report.

^aComparisons between this survey and the preceding survey are statistically significant at the 95% confidence level.

^bAdjusted estimates have been standardized to the 1980 distribution by age, education, and marital status.

^cComparisons between 1980 and 1998 are statistically significant at the 95% confidence level.

Source: DoD Surveys of Health Related Behaviors Among Military Personnel, 1980 to 1998 (1998 Questions: Heavy Alcohol Use, Q15-18 and 20-23; Any Illicit Drug use, Q60 and 67; Cigarette Use, Q44 and 47).

- symptoms of dependence decreased significantly from 8.0% in 1980 to 4.8% in 1998.

3.2 Progress Toward *Healthy People 2000* Objectives

A major aim of the 1998 DoD survey was to measure progress toward selected *Healthy People 2000* objectives for a variety of health behaviors. In addition to the objective discussed above for reducing cigarette smoking to a prevalence of 20% or less, the other specific objectives were noted previously in Chapter 1. In this section, we describe overall findings from the total DoD for these objectives. Subsequent chapters provide additional analyses and discussion about the objectives. In addition, we also provide findings for the new National Heart, Lung, and Blood Institute (NHLBI) guidelines on overweight (see Chapter 2 for a discussion of definitions). Like the guidelines on overweight for *Healthy People 2000*, these new guidelines also are based on the BMI (the ratio of a person's weight in kilograms to the square of that person's height in meters), but use different cutoff values. Table 5 presents the first 10 *Healthy People 2000* objectives plus the NHLBI guidelines for overweight and corresponding DoD data for 1995 and 1998. Information about objectives 11 and 12 is presented in Table 6.

3.2.1 Smokeless Tobacco Use (Objective 1)

As shown in Table 5, for the objective for smokeless tobacco use in the past 30 days, military men aged 18 to 24 showed a prevalence of 19.0% for 1998, which was a nonsignificant change from 21.9% in 1995. This 1998 rate was almost five times higher than the objective of 4%. Given the rather large disparity between the smokeless tobacco rate among young adult males and the *Healthy People 2000* goal, the Military faces a considerable challenge to reduce smokeless tobacco use among young males to the targeted level by the year 2000.

3.2.2 Overweight (Objective 2)

As shown in Table 5, based on their BMI, 22.9% of all military personnel in 1998 under the age of 20 were classified as overweight, and 19.5% of personnel aged 20 or older were defined as overweight based on *Healthy People 2000* guidelines. These data did not differ significantly from results in 1995 for those under 20, but showed a significant increase in overweight among personnel aged 20 or older. Despite this increase, the 1998 prevalence of overweight still fell below the objective for personnel aged 20 or older. Thus, for both years of data, personnel in the total DoD under the age of 20 were somewhat above the objective of no more than a 15% prevalence of overweight, whereas personnel aged 20 or older had met the goal of no more than a 20% prevalence of overweight. The significant increase in overweight, however, suggests that this is an area that may need attention.

Table 5. Progress Toward Selected *Healthy People 2000* Objectives, Total DoD, 1995-1998

Characteristic/Group	Objective	Year	
		1995	1998
Smokeless tobacco use, past 30 days			
Males, aged 18 to 24	≤ 4%	21.9 (1.0)	19.0 (0.8)
Overweight—<i>Healthy People 2000</i> Guidelines^a			
Under age 20	≤ 15%	19.0 (1.4)	22.9 (2.0)
Aged 20 or older	≤ 20%	16.7 (0.4)	19.5 (0.5) ^{*b}
Overweight—1998 NHLBI Guidelines^c			
Under age 20	≤ 15%	27.6 (1.7)	30.5 (2.1)
Aged 20 or older	≤ 20%	50.2 (0.6)	53.9 (0.5) [*]
Strenuous exercise, past 30 days^d			
All personnel	≥ 20%	65.4 (0.9)	67.7 (0.9) ^b
Blood pressure, checked past 2 years and know result			
All personnel	≥ 90%	76.3 (0.9)	80.4 (0.5) [*]
Taking action to control high blood pressure^e			
Personnel with history of high blood pressure	≥ 90%	49.3 (1.3)	46.5 (1.4)
Cholesterol checked, past 5 years			
All personnel	≥ 75%	60.1 (1.5)	62.4 (1.1)
Hospitalization for injuries, past 12 months			
All personnel	≤ 754 per 100,000	3,388 (235)	3,271 (237)
Seat belt use^f			
All personnel	≥ 85% of occupants	90.6 (0.7)	91.4 (0.7) ^b
Helmet use, past 12 months^f			
Motorcyclists	≥ 80%	71.0 (1.3)	75.9 (0.9) [*]
Bicyclists	≥ 50%	22.8 (1.8)	44.2 (1.7) [*]
Condom use at last encounter			
Sexually active unmarried personnel ^g	≥ 50%	40.4 (1.0)	41.8 (1.0)

Note: Table entries are percentages (with standard errors in parentheses), except for hospitalization for injuries, which is expressed per 100,000 personnel.

*Comparisons between 1995 and 1998 are statistically significant at the 95% confidence level.

^aDefinition of BMI is given in Section 2.2. Personnel under age 20 were defined as overweight if BMI ≥ 25.8 for men or BMI ≥ 25.7 for women. Personnel aged 20 and older were defined as overweight if BMI ≥ 27.8 for men or BMI ≥ 27.3 for women (Q95 and 96) (PHS, 1991).

^bMet or exceeded *Healthy People 2000* objective.

^cDefinition of BMI is given in Section 2.2. NHLBI (1998) guidelines define four levels of overweight, regardless of age or gender: (1) overweight (BMI of 25.0 to 29.9); (2) obesity I (BMI of 30.0 to 34.9); (3) obesity II (BMI of 35.0 to 39.9); and (4) extreme obesity (BMI of 40.0 or greater). For these analyses, these four levels were aggregated such that personnel were considered overweight if their BMI was ≥ 25.0 (Q95 and 96).

^dOne or both of the following three or more times a week for 20 minutes or more: running/cycling/walking, or other strenuous exercise (Q68A and C).

^eEstimate subsetting to personnel who had ever been told they had high blood pressure (other than pregnancy-related). These personnel were defined as taking action to control their high blood pressure if (a) they had been advised by a health professional to take blood pressure medication, diet to reduce their weight, reduce their salt intake, or exercise; and (b) they were currently taking one or more of these advised actions (Q99-100, 101A-C, 102A-C and 102E).

^fReported wearing seat belts or helmets "always" or "nearly always." Objectives on helmet use were subsetting to personnel who rode a motorcycle or bicycle in the past 12 months (Seat Belt Use, Q72; Bicycle Helmet Use, Q76 and 77; Motorcycle Helmet Use, Q74 and 75).

^gDefined as unmarried personnel who had one or more sexual partners in the past 12 months. For consistency with 1995 estimates, the 1998 estimates do not include personnel who are living as married (Q113 and 114).

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1995-1998 (Smokeless Tobacco Use, Past 30 Days, Q55 and 51; Blood Pressure, Checked Past 2 Years and Know Result, Q97-98; Cholesterol Checked, Past 5 Years, Q103; Hospitalization for Injuries, Past 12 Months, Q71).

Because the NHLBI cutoff values for defining overweight are more conservative in that they are lower than the *Healthy People 2000* guidelines, the percentages of military personnel classified as overweight were substantially higher than those observed for the *Healthy People 2000* guidelines. For 1998, 30.5% of personnel under age 20 were defined as overweight, and 53.9% of those aged 20 or older were classified as overweight. For 1995, the corresponding percentages were 27.6% and 50.2% respectively. The data under the NHLBI guidelines essentially show the same relative relationships between 1995 and 1998 as are shown for the *Healthy People 2000* guidelines, but the threshold of the two guidelines is notably different.

Presently, the DoD has not adopted the NHLBI guidelines for defining overweight. These analyses make clear that if at some future time they do so, the impact will be to shift a sizable group of personnel from a category of meeting weight standards to a category of being overweight. This would result from lowering the cutoff value in the scale, but it would not be due to any change in behavior or appearance of the Military. Such a change would have negative implications for perceptions of readiness of the force.

3.2.3 Exercise (Objective 3)

The objective for exercise examines personnel who engaged in strenuous exercise (running/cycling/walking or other strenuous exercise, such as swimming laps) at least 3 days per week for at least 20 minutes per occasion in the past 30 days. As shown in Table 5, 68% of personnel in the total DoD reported meeting this requirement in 1998 and 65% for 1995. Data for both years far exceed the *Healthy People 2000* objective of 20% or greater for the general adult population.

3.2.4 Blood Pressure (Objectives 4 and 5)

Table 5 also presents findings on percentages of personnel who had their blood pressure checked in the 2 years prior to the survey and who also were aware of the result. We classified personnel as *not* meeting these criteria if they (a) last had their blood pressure checked more than 2 years before the survey, (b) could not recall when they last had their blood pressure checked, or (c) were not aware of the result of their last blood pressure check (e.g., high, low, normal), even if it occurred in the past 2 years. Overall, in 1998, 80.4% of total DoD personnel had their blood pressure checked in the past 2 years and could state the result. Although this rate was somewhat lower than the *Healthy People 2000* target of 90%, it nonetheless represents a significant increase in blood pressure awareness from 76.3% in 1995. In addition, for 1998, 46.5% of all military personnel who had a lifetime history of high blood pressure were taking one or more recommended actions to control it at the time of the 1998 DoD survey. Although this number indicates that about half of military personnel were consciously taking steps to control their high blood pressure, it falls well below the 90% level, which is the *Healthy*

People 2000 objective. Although not significant, the data show a slight drop in the percentages from 1995 on this measure.

3.2.5 Cholesterol (Objective 6)

As shown in Table 5 for 1998, some 62.4% of all personnel in the total DoD in 1998 and some 60.1% in 1995 had their cholesterol checked within the preceding 5 years. These rates were somewhat lower than the *Healthy People 2000* target of 75% for adults. Although the Military was below the goal, part of the reason may be related to military regulations that specify age-dependent screening criteria. In view of age-specific regulations, it may be advisable for the DoD to set its own targets for the Military, at least for cholesterol, rather than relying on the targets for civilians.

3.2.6 Injuries and Injury Prevention (Objective 7)

Table 5 also presents estimates of the prevalence of hospitalization for treatment of injuries in the 12 months prior to the survey. The estimates for hospitalization are presented as the number of personnel hospitalized for treatment of injuries per 100,000 active-duty personnel. Analyses of the 1998 survey showed that for every 100,000 active-duty personnel, approximately 3,300 were hospitalized for treatment of an injury in the past 12 months. The 1998 rate was about four times higher than the *Healthy People 2000* target of 754 per 100,000 people.

It should be noted that the *Healthy People 2000* objective for hospitalization for injuries refers specifically to unintentional injuries. The 1995 and 1998 DoD survey measure of hospitalization for injuries does not distinguish between unintentional injuries and intentional injuries. Intentional injuries are those that result from deliberate intent to harm an individual or oneself (e.g., assault, suicide) and differ from injuries that result from other agents or events (e.g., running injury, motor vehicle crash). To have examined the distinction between unintentional and intentional injuries in the survey would have required the addition of a series of questions and skip patterns. Due to space limitations and the expectation that few injuries experienced by military personnel would be intentional injuries, we decided to ask just about the overall rate of injuries. Because the number of hospitalizations due to intentional injuries is likely to be small, the high rate of hospitalizations for injuries for both 1995 and 1998 cannot be explained by *intentional* injuries.

3.2.7 Seat Belt Use (Objective 8)

Table 5 shows that in 1998, 91.4% of DoD personnel wore seat belts "always" or "nearly always" when they drove or rode in an automobile. This commendably high rate was comparable to the rate of 90.6% observed in 1995 and exceeds the *Healthy People 2000* target of use of occupant protection systems by at least 85% of motor vehicle occupants.

These high rates of seat belt use among military personnel, in part, may be a result of regulations requiring personnel to use seat belts when they are driving or riding in motor vehicles on military installations.

3.2.8 Helmet Use (Objective 9)

Table 5 also shows data on helmet use by motorcyclists and bicyclists in the past 12 months. Among personnel in 1998 who rode a *motorcycle* at least once in the past 12 months, 75.9% wore helmets always or nearly always. This represents a significant increase from 71.0% who reported this behavior in 1995. Although the 1998 overall rate indicates progress since 1995, it remains somewhat below the *Healthy People 2000* objective of increasing helmet use to at least 80% of motorcyclists. Among personnel in 1998 who rode *bicycles* in the past 12 months, 44.2% or more than two in five used helmets always or nearly always. This rate is nearly double the rate of 22.8% in 1995 and represents the behavior with the greatest improvement among the *Healthy People 2000* objectives studied here. Nonetheless, the 1998 rate still remained somewhat below the *Healthy People 2000* objective of helmet use by at least 50% of bicyclists.

3.2.9 Condom Use (Objective 10)

The bottom row in Table 5 presents findings on condom use among sexually active unmarried personnel in the Military the last time they had intercourse. We defined "sexually active" personnel as those who had vaginal or anal intercourse in the 12 months prior to the survey. As shown, in 1998, some 41.8% of unmarried personnel in the total DoD who were sexually active in the past 12 months used a condom. This rate was nearly identical to the rate of 40.4% observed in 1995 and was lower than the *Healthy People 2000* objective of 50% condom use among sexually active unmarried persons at the last episode of sexual intercourse.

3.2.10 Pap Tests (Objective 11)

The major way that women can lessen the risk of cervical cancer is through regular Pap smear tests. As shown in Table 6, based on the 1998 survey, 97.8% of military women had ever received such tests and 95.9% had received the tests within the past 3 years. These high rates are virtually identical to those observed in 1995. Military women, overall, exceeded the *Healthy People 2000* objectives of 95% having ever had a Pap smear and 85% having had one in the past 3 years. The near universality of receipt of Pap smears is notable and probably reflects both ready access to care and mandatory care at specified intervals for military women.

Table 6. Progress Toward Selected *Healthy People 2000* Objectives for Military Women, Total DoD, 1995-1998

Characteristic	Objective	Year	
		1995	1998
Pap Smear ^a			
Ever received	≥ 95%	97.1 (0.6)	97.8 (0.2)
Received in past 3 years	≥ 85%	95.2 (0.7)	95.9 (0.4)
Substance Use During Last Pregnancy ^c			
No alcohol use	≥ 88% ^b	85.2 (1.3)	85.8 (1.2)
No cigarette use	≥ 90%	83.9 (1.4)	85.8 (1.3)

Note: Table entries are percentages (with standard errors in parentheses).

^aEstimate made for women with an intact uterine cervix ($N=3,760$ in 1998, and $N=2,807$ in 1995).

^bAlthough the *Healthy People 2000* objective refers to a 20% increase in abstinence from alcohol during pregnancy, this objective would be virtually impossible to achieve because of the very high rate in 1995. Therefore, progress toward this objective was measured in terms of a 20% *reduction* in the prevalence of alcohol use during pregnancy as opposed to a 20% increase in abstinence. A 20% reduction in the prevalence of alcohol use during pregnancy relative to 1995 would result in an alcohol use prevalence of about 12% and a corresponding prevalence of 88% who abstained.

^cEstimate based on 1,299 in 1998 and 1,077 in 1995 women who were pregnant in the past 5 years. For women who were pregnant at the time of the survey, "last pregnancy" refers to the *current* pregnancy.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1995 and 1998 (1998 Questions: Pap Smear, Q134 and 135; Substance Use During Last Pregnancy: No Alcohol Use, Q137 and 141-142, No Cigarette Use, Q137 and 139-140).

3.2.11 Substance Use Reduction During Pregnancy (Objective 12)

Avoidance of substance use during pregnancy is important in ensuring maternal and infant health. The *Healthy People 2000* objective states that the percentage of women abstaining from alcohol during pregnancy should be increased by at least 20%. This objective is stated differently from others in that it specifies measuring a change from baseline rather than a specific percentage target. Because there was no prior baseline data, the rate of abstinence from alcohol during pregnancy from the 1995 survey (i.e., 85.2%) serves as the baseline from which to measure change. A 20% increase, however, in *abstinence* from alcohol during pregnancy relative to this 1995 baseline of approximately 85% would effectively require 100% of military women to abstain from alcohol during pregnancy. Although this would be an ideal goal in principle, it could be difficult if not impossible in practice to achieve this outcome.

For this particular objective, it may therefore be more useful to think in terms of *reducing* the prevalence of military women's alcohol use during pregnancy by 20%, as opposed to increasing the prevalence of abstinence from alcohol by 20%. If approximately

15% of military women in 1995 who were pregnant in the 5 years prior to that survey used alcohol during their most recent pregnancies, then a corresponding 1998 prevalence of about 12% would represent a 20% reduction in the prevalence of alcohol use during pregnancy relative to 1995. For consistency in the way the data are presented in Table 6, however, we state attainment of this objective in terms of 88% of women abstaining from alcohol (i.e., 100% minus 12%).

As shown in Table 6 for 1998, 85.8% of military women who had been pregnant in the past 5 years reported that they did not consume any alcohol during their last pregnancy. These data are encouraging, but there was no change from the 1995 rate of 85.2%; consequently, the 1998 rate remains below the target of 88%. Again, the lack of a significant change from 1995 to 1998 probably reflects the very high prevalence of abstinence from alcohol during pregnancy that was observed in 1995. Table 6 also shows that 85.8% of military women in 1998 who were pregnant during the past 5 years reported no cigarette use during their most recent pregnancy. This rate was about the same as observed in 1995 and fell slightly below the *Healthy People 2000* objective of increasing abstinence from tobacco use during pregnancy to 90% or higher.

3.3 Summary

Overall, these findings indicate that the Military has made steady and notable progress during the past 18 years in combating illicit drug use and smoking and in reducing alcohol-related problems. The DoD has made less progress in reducing heavy alcohol use. These findings are consistent with the Military's strong emphasis on the reduction of drug abuse that began in the early 1980s (DoD, 1980a, 1980b, 1985a, 1985b, 1997) and cessation of smoking that began during the mid-1980s (DoD, 1986, 1994).

Despite notable progress, there is still room for considerable improvement in some areas. Cigarette smoking remains common, affecting nearly one in every three military personnel, and the rate of heavy alcohol use—the consumption level most likely to result in alcohol-related problems—affects more than one in seven active-duty personnel. Further, when we adjusted the estimates of heavy alcohol use to reflect changes in the sociodemographic composition of the Military, we found that the 1998 rate had not changed significantly from the 1980 rate. This finding suggests that the observed declines in heavy alcohol use from 1980 to 1998 (unadjusted rates) were largely a function of changes in the demographic composition of the Military and that stronger initiatives and efforts will be needed to reduce heavy alcohol use.

The Military also has made progress in a number of areas toward meeting selected *Healthy People 2000* objectives:

- Overall, the Military met or exceeded 5 of the 17 targets (overweight for personnel aged 20 or older, strenuous exercise, seat belt use, Pap smears ever received, and Pap smears received in the past 3 years).
- Military personnel are 10 percentage points or less away from reaching the *Healthy People 2000* targets for another 7 of the 17 behaviors (overweight for personnel under age 20, blood pressure checked past 2 years and knowing the result, helmet use for motorcyclists, helmet use for bicyclists, condom use, no alcohol use during pregnancy, no cigarette use during pregnancy).

Considerable effort will be needed to meet the objectives in all areas by the year 2000. It is noteworthy that the areas where targets have been met are those where military regulations help ensure compliance with the desired behaviors (weight control, exercise, seat belt use, Pap tests). It is not clear whether the targets for these behaviors would have been achieved without such requirements. It seems clear that it will be more challenging to reach the targets in other areas where change is more dependent on the initiative of individuals. Findings suggest that the largest gaps and greatest challenges will be to meet the objectives for smoking, smokeless tobacco use among males aged 18 to 24, controlling high blood pressure, and reducing hospitalization rates for injuries.

4. ALCOHOL USE

In this chapter, we report the results of alcohol use among military personnel. We examine trends in alcohol use, comparisons of alcohol use in each Service and the total DoD, correlates of heavy alcohol use, negative effects of alcohol use, participation in counseling and treatment programs, and levels of use among military personnel compared with use among civilians. Negative effects of alcohol use include serious consequences, productivity loss, and dependence symptoms. As described in Chapter 2, we define alcohol use in terms of both average ounces of alcohol (i.e., ethanol) consumed and levels of alcohol use, with special emphasis on the heaviest level of alcohol use. Chapter 2 also details modifications to the survey questionnaire made in 1985 and in 1998 that affect the average daily alcohol consumption and heavy alcohol use measures.

4.1 Trends in Alcohol Use

In this section, we provide two sets of estimates of alcohol use for the survey years from 1980 to 1998: the average daily ounces of alcohol (ethanol) and heavy alcohol use in the past 30 days. For each measure, we provide both observed (unadjusted) estimates and adjusted estimates; the latter take into account differences in sociodemographic characteristics of the Military over the course of the surveys.

In 1998, the average amount of alcohol consumed daily and the proportion of military personnel who were heavy drinkers were the lowest since the survey series began (Tables 7 and 8):

- The unadjusted average daily amount of alcohol (ethanol) consumed by total DoD personnel decreased significantly from 1.48 ounces in 1980 to 0.79 ounce in 1998, a decrease of 47% in 18 years. All Services also showed similar decreases, all of which were statistically significant.
- Unadjusted rates of heavy alcohol use showed significant declines between 1980 and 1998 among total DoD personnel and for personnel in the Navy, but not for members of the other three Services.
- Comparisons of unadjusted rates of ethanol consumed and heavy alcohol use in 1995 with those in 1998 showed that changes from 1995 to 1998 were not significant for the total DoD, the Army, the Marine Corps, and the Air Force. In contrast, the Navy showed a significant decrease in the ounces of ethanol consumed in 1995 (0.93%) and 1998 (0.70%) and in the rate of heavy alcohol use from 1995 (19.1%) to 1998 (13.5%). These decreases in the Navy suggest that the *Right Spirit* campaign to prevent and deglamorize alcohol abuse may be having a positive effect.

Table 7. Trends in Average Daily Ounces of Ethanol Consumed, Past 30 Days, Unadjusted and Adjusted for Sociodemographic Differences, 1980-1998

Service/Type of Estimate	Year of Survey					
	1980	1982	1985	1988	1995	1998
Army						
Unadjusted	1.61 (0.10)	1.58 (0.08)	1.42 (0.13)	1.12 (0.06) ^a	0.90 (0.06) ^a	0.94 (0.07) ^c
Adjusted ^b	1.61 (0.10)	1.51 (0.06)	1.49 (0.12)	1.26 (0.05)	1.09 (0.06) ^a	1.14 (0.08) ^c
Navy						
Unadjusted	1.64 (0.12)	1.64 (0.12)	1.34 (0.10)	0.88 (0.08) ^a	0.85 (0.11)	0.70 (0.07) ^{a,c}
Adjusted ^b	1.64 (0.12)	1.58 (0.09)	1.48 (0.09)	0.97 (0.04) ^a	0.94 (0.10)	0.93 (0.09) ^c
Marine Corps						
Unadjusted	1.75 (0.09)	1.45 (0.09) ^a	1.49 (0.23)	1.20 (0.11)	1.04 (0.06)	1.08 (0.11) ^c
Adjusted ^b	1.75 (0.09)	1.47 (0.02) ^a	1.60 (0.21)	1.46 (0.20)	1.07 (0.06)	1.27 (0.10) ^c
Air Force						
Unadjusted	1.08 (0.11)	0.96 (0.05)	0.87 (0.07)	0.66 (0.03) ^a	0.52 (0.03) ^a	0.54 (0.04) ^c
Adjusted ^b	1.08 (0.11)	0.97 (0.04)	0.91 (0.06)	0.71 (0.03) ^a	0.61 (0.04) ^a	0.65 (0.04) ^c
Total DoD						
Unadjusted	1.48 (0.07)	1.41 (0.05)	1.24 (0.06) ^a	0.92 (0.03) ^a	0.79 (0.04) ^a	0.79 (0.04) ^c
Adjusted ^b	1.48 (0.07)	1.38 (0.03)	1.34 (0.06)	1.05 (0.03) ^a	0.91 (0.04) ^a	0.96 (0.04) ^c

Note: Table entries are mean ounces of ethanol (with standard errors in parentheses). Adjusted estimates take into account sociodemographic changes within Services across survey years; estimates have not been adjusted for sociodemographic differences among Services. Definitions and measures of substance use are given in Section 2.2. The algorithm for computing average daily ounces of ethanol consumed was altered for this report as follows: Estimates for average daily ounces of ethanol consumed for 1998 take into account both 32-ounce or liter and 40-ounce size containers. Estimates for average daily ounces of ethanol consumed for 1985 to 1995 take into account 32-ounce or liter containers, but not 40-ounce containers. Therefore, estimates for 1985 to 1995 average daily ounces of ethanol consumed differ slightly from those reported in previous DoD survey reports. Table A.10 compares estimates of average daily ounces of ethanol consumed for 1985 to 1998 based on the algorithm used in previous reports and the algorithm used in this report.

^aComparisons between this survey and the preceding survey are statistically significant at the 95% confidence level.

^bEstimates have been standardized to the 1980 DoD or Service-specific distribution by age, education, and marital status.

^cComparisons between 1980 and 1998 are statistically significant at the 95% confidence level.

Source: DoD Surveys of Health Related Behaviors Among Military Personnel, 1980 to 1998 (1998 Questions: Average Daily Ounces of Ethanol, Past 30 Days, Q15-23 and 28-30).

Table 8. Trends in Heavy Alcohol Use, Past 30 Days, Unadjusted and Adjusted for Sociodemographic Differences, 1980-1998

Service/Type of Estimate	Year of Survey						
	1980	1982	1985	1988	1992	1995	1998
Army							
Unadjusted	20.3 (1.6)	24.7 (1.4) ^a	25.5 (2.2)	19.7 (1.2) ^a	17.7 (1.6)	18.4 (1.8)	17.2 (1.6)
Adjusted ^b	20.3 (1.6)	23.5 (1.3)	26.7 (1.8)	23.2 (0.8)	23.0 (1.8)	21.2 (1.8)	21.7 (1.5)
Navy							
Unadjusted	25.6 (2.3)	27.7 (2.9)	25.0 (1.4)	14.7 (2.0) ^a	14.2 (1.7)	19.1 (1.5) ^a	13.5 (1.8) ^{a,c}
Adjusted ^b	25.6 (2.3)	26.7 (2.4)	27.3 (1.9)	16.3 (3.6) ^a	16.6 (3.4)	23.9 (1.5)	18.2 (2.1) ^{a,c}
Marine Corps							
Unadjusted	28.6 (2.5)	30.6 (0.9)	29.4 (3.7)	24.4 (4.2)	26.0 (1.3)	28.6 (2.5)	23.0 (2.1)
Adjusted ^b	28.6 (2.5)	31.6 (2.4)	32.5 (3.2)	30.7 (4.2)	30.4 (1.3)	33.5 (1.9)	26.9 (1.8) ^a
Air Force							
Unadjusted	14.3 (1.4)	17.7 (1.2)	16.5 (1.4)	14.5 (1.0)	10.6 (0.8) ^a	10.4 (1.1)	11.7 (1.0)
Adjusted ^b	14.3 (1.4)	18.1 (0.8) ^a	17.5 (1.2)	16.1 (0.9)	12.9 (0.8) ^a	12.0 (0.9)	14.7 (1.0) ^a
Total DoD							
Unadjusted	20.8 (1.1)	24.1 (1.0) ^a	23.0 (1.1)	17.2 (0.9) ^a	15.5 (0.8)	17.4 (0.9)	15.4 (0.8) ^c
Adjusted ^b	20.8 (1.1)	23.6 (0.9) ^a	24.8 (0.9)	20.1 (1.1) ^a	19.1 (1.2)	20.5 (0.8)	19.3 (0.9)

Note: Table entries are percentages (with standard errors in parentheses). Adjusted estimates take into account sociodemographic changes *within* Services across survey years; estimates have not been adjusted for sociodemographic differences *among* Services. Definitions and measures of substance use are given in Section 2.2. The algorithm for computing drinking levels (including heavy alcohol use) was altered for this report as follows: Estimates for heavy alcohol use for 1998 take into account both 32-ounce or liter and 40-ounce size containers. Estimates for heavy alcohol use for 1985 to 1995 take into account 32-ounce or liter containers, but not 40-ounce containers. Therefore, 1985 to 1995 heavy alcohol use estimates differ slightly from those reported in previous DoD survey reports. Tables A.5 through A.9 compare drinking-level estimates for 1985 to 1998 based on the algorithm used in previous reports and the algorithm used in this report.

^aComparisons between this survey and the preceding survey are statistically significant at the 95% confidence level.

^bEstimates have been standardized to the 1980 DoD or Service-specific distribution by age, education, and marital status.

^cComparisons between 1980 and 1998 are statistically significant at the 95% confidence level.

Source: DoD Surveys of Health Related Behaviors Among Military Personnel, 1980 to 1998 (1998 Questions: Heavy Alcohol Use, Q15-18 and 20-23).

- Adjusted estimates showed no significant decline in the rates of heavy alcohol use between 1980 and 1998 among total DoD personnel or for any Service, except the Navy. This indicates that sociodemographic changes in the Military between 1980 and 1998 accounted for most of the reductions observed in the unadjusted estimates and may indicate that the Military's programmatic efforts may not have had much effect in reducing heavy alcohol use among its members.

To summarize, the average amount of alcohol consumption decreased significantly between 1980 and 1998 for the total DoD and for personnel from the individual Services. Adjusted estimates, however, suggest that reductions in heavy alcohol use between 1980 and 1998 both for the total DoD and for each of the Services (except perhaps the Navy) appear to have been largely a reflection of changes in the sociodemographic composition of the Military rather than a result of efforts intended to reduce heavy alcohol use. These findings indicate that further effort will be needed to reduce heavy alcohol use in the Military.

4.2 Service Comparisons of Alcohol Use

In this section, we provide two sets of estimates both for average daily ethanol use and for the prevalence of heavy alcohol use in 1998 for each of the Services. We begin by presenting unadjusted estimates for each of the Services. The unadjusted estimates reflect the actual average amount of alcohol consumed per day and the prevalence of heavy alcohol use in 1998 for each of the Services. The unadjusted estimates, however, are descriptive only and yield no explanatory information about differences among the Services.

The unadjusted estimates presented in Table 9 reveal the following:

- Comparisons of unadjusted estimates showed that average daily ethanol consumption in 1998 was significantly lower among Air Force personnel than among members of the Army and the Marine Corps, but not among members of the Navy.
- Unadjusted rates of heavy alcohol use were significantly lower among Air Force personnel than among personnel from the Army and the Marine Corps, but not the Navy. Approximately one in four Marines (23.0%) drank heavily in the 30 days before the survey; such a high prevalence of heavy alcohol use may be cause for concern about military readiness.

As discussed in Section 2.1, one possible explanation for differences across the Services is differences in their sociodemographic composition. To address this possibility, we also provide adjusted estimates of ethanol use and heavy alcohol use, using direct standardization procedures to control for sociodemographic differences. These constructed estimates resulting from standardization permit comparisons among the Services, as if each Service had the sociodemographic composition of the total DoD in 1998.

Table 9. Estimates of Alcohol Use, Unadjusted and Adjusted for Sociodemographic Differences, by Service

Measure/ Type of Estimate	Service				Total DoD
	Army	Navy	Marine Corps	Air Force	
Average Daily Ounces of Ethanol					
Unadjusted	0.94 (0.07) ^{a,b}	0.70 (0.07) ^c	1.08 (0.11) ^{a,b}	0.54 (0.04)	0.79 (0.04)
Adjusted ^d	0.92 (0.05) ^{a,b}	0.73 (0.06)	0.79 (0.05) ^a	0.64 (0.04)	0.79 (0.04)
Heavy Alcohol Use					
Unadjusted	17.2 (1.6) ^{a,c}	13.5 (1.8) ^c	23.0 (2.1) ^a	11.7 (1.0)	15.4 (0.8)
Adjusted ^d	17.1 (1.1)	13.7 (1.5)	16.4 (0.8)	13.9 (0.9)	15.4 (0.8)

Note: Table entries for average daily ounces of ethanol are mean values, and entries for heavy drinkers are percentages. Standard errors are in parentheses. Pairwise significance tests were done between all possible Service combinations (e.g., Army vs. Navy, Navy vs. Marine Corps). Differences that were statistically significant are indicated. Definitions and measures of substance use are given in Section 2.2.

^aEstimate is significantly different from the Air Force at the 95% confidence level.

^bEstimate is significantly different from the Navy at the 95% confidence level.

^cEstimate is significantly different from the Marine Corps at the 95% confidence level.

^dAdjusted estimates have been standardized by gender, age, education, race/ethnicity, and marital status to the total DoD distribution.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Average Daily Ounces of Ethanol, Q15-23 and 28-30; Heavy Alcohol Use, Q15-18 and 20-23).

The adjusted estimates in Table 9 show the following:

- The adjusted estimates for both average daily ethanol consumption and heavy alcohol use decreased among Army and Marine Corps personnel and increased among Navy and Air Force personnel. After the adjustment, estimates of average daily ounces of ethanol and heavy alcohol use among Army personnel surpassed the rates of Marine Corps personnel, which were the highest prior to the adjustment.
- The adjusted estimate for average daily ethanol consumption among Army personnel remained significantly higher than in the Air Force and Navy. The adjusted estimate among Marine Corps personnel remained significantly higher than that of the Air Force; however, the adjusted estimate for the Navy was no longer significantly different from the Marine's.
- The adjusted estimate for heavy alcohol use eliminated any significant differences between the Services seen in the unadjusted rates. The Army and Marine Corps had a slightly higher percentage of heavy drinkers than the Navy and the Air Force, but these differences were not statistically significant.

These results indicate that some of the differences seen between the Services in the rates of average daily ethanol consumption and heavy alcohol use were explained by the sociodemographic composition of these Services. This finding is particularly important for the Marine Corps, which has consistently shown the highest unadjusted rates of heavy alcohol use across the DoD survey series. The distinctive sociodemographic makeup of the Marine Corps, which has a higher representation of personnel at greater risk for heavy alcohol use, is an important factor in its rate of heavy alcohol use. As long as the Marine Corps has higher representation of personnel at greater risk for heavy alcohol use than do the other Services, then the Marine Corps and likely to continue to face the greatest challenge in discouraging heavy alcohol use among its personnel.

4.3 Correlates of Heavy Alcohol Use

This section examines the correlates of heavy alcohol use. Two types of analyses were conducted: descriptive prevalence analyses and multivariate logistic regression analyses. Results of both are presented in Table 10, with column 2 presenting prevalence data for the demographic groups and column 3 showing the odds ratios from the logistic regression.

The prevalence rates indicate substantial differences for Service, gender, race/ethnicity, education, age, family status, and pay grade. As discussed previously, heavy alcohol use was more prevalent among Army, Navy, and Marine Corps personnel than among Air Force personnel. This analysis reveals that heavy alcohol use also was more prevalent among males, non-Hispanic Caucasians and Hispanics, those with less education, those 25 or younger, those not married or those who were married but unaccompanied by their spouse, and those in pay grades E1 to E6.

Surveys of military and civilian populations have established certain enduring patterns in alcohol use among sociodemographic groups that are useful in targeting prevention and treatment efforts. Logistic regression analyses showed that Service, gender, race/ethnicity, education, age, family status, and pay grade were significantly related to heavy alcohol use. Specifically, the odds of heavy alcohol use were greater among the following (Table 10):

- Army and Marine Corps personnel compared with Navy and Air Force personnel;
- males compared with females;
- non-Hispanic Caucasians and Hispanics compared with non-Hispanic African Americans and those in the "other" racial/ethnic category;
- those with a high school education or less and those with some college compared with those with more education;

Table 10. Demographic Correlates of Heavy Alcohol Use, Past 30 Days, Total DoD

Sociodemographic Characteristic	Prevalence		Adjusted Odds Ratio ^a	95% CI of Odds Ratio ^b
Service				
Army	17.2	(1.6)	1.30 ^c	(1.04, 1.62)
Navy	13.5	(1.8)	0.98	(0.70, 1.37)
Marine Corps	23.0	(2.1)	1.27 ^c	(1.03, 1.57)
Air Force	11.7	(1.0)	1.00	NA
Gender				
Male	17.2	(0.9)	5.24 ^c	(4.26, 6.44)
Female	4.1	(0.4)	1.00	NA
Race/Ethnicity				
Caucasian, non-Hispanic	16.5	(0.9)	1.00	NA
African American, non-Hispanic	11.5	(1.2)	0.59 ^c	(0.47, 0.74)
Hispanic	18.3	(1.3)	0.91	(0.77, 1.08)
Other	11.1	(1.2)	0.60 ^c	(0.48, 0.74)
Education				
High school or less	24.3	(1.2)	2.28 ^c	(1.65, 3.15)
Some college	14.2	(0.8)	1.61 ^c	(1.16, 2.23)
College graduate or higher	5.6	(0.5)	1.00	NA
Age				
20 or younger	24.2	(1.9)	1.39	(0.98, 1.97)
21-25	25.6	(1.3)	2.14 ^c	(1.65, 2.80)
26-34	11.3	(0.9)	1.24	(1.00, 1.53)
35 or older	6.7	(0.6)	1.00	NA
Family Status^d				
Not married	23.9	(1.2)	2.43 ^c	(2.10, 2.79)
Married, spouse not present	18.5	(1.6)	1.96 ^c	(1.58, 2.42)
Married, spouse present	8.8	(0.7)	1.00	NA
Pay Grade				
E1-E3	25.9	(1.3)	2.96 ^c	(1.61, 5.44)
E4-E6	16.6	(1.0)	2.76 ^c	(1.62, 4.71)
E7-E9	8.1	(0.5)	2.32 ^c	(1.45, 3.73)
W1-W5	6.5	(1.3)	1.59	(0.87, 2.91)
O1-O3	7.3	(0.9)	2.07 ^c	(1.34, 3.19)
O4-O10	2.2	(0.4)	1.00	NA
Region				
CONUS ^e	14.3	(0.9)	0.78	(0.64, 0.97)
OCONUS ^f	18.6	(1.9)	1.00	NA
Total	15.4	(0.8)	NA	NA

Note: Prevalence estimates are percentages (with standard errors in parentheses). Definitions and measures of substance use are given in Section 2.2.

NA = Not applicable.

^aOdds ratios were adjusted for Service, gender, race/ethnicity, education, age, family status, pay grade, and region.

^b95% CI = 95% confidence interval of the odds ratio.

^cOdds ratio is significantly different from the reference group.

^dEstimates by family status in 1998 are not strictly comparable to those from other survey years. In 1998, personnel who reported that they were living as married were classified in the "not married" group. In prior years, the marital status question did not distinguish between personnel who were married and those who were living as married.

^eRefers to personnel stationed within the 48 contiguous States in the continental United States.

^fRefers to personnel stationed outside the continental United States or aboard afloat ships.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Heavy Alcohol Use, Past 30 Days, Q15-18 and 20-23; refer to Section 2.2 for descriptions of sociodemographic variables).

- those younger than age 35 compared with those aged 35 or older;
- those who were single or married with spouse absent compared with those who were married with spouse present; and
- those in enlisted pay grades E1 to E9 through O1 to O3 compared with those in pay grades O4 to O10.

Pay grade and gender showed the strongest effects in the model. Junior personnel in pay grades E1 to E3 had odds of being heavy drinkers three times greater than senior officers in pay grades O4 to O10, and personnel in pay grades E4 to E9 had odds from over two to nearly three times greater. The odds of junior officers in pay grades O1 to O3 being heavy drinkers were two times that of senior officers. Male personnel had odds more than five times those of female personnel to be heavy drinkers. The logistic model also showed that the odds of being heavy drinkers for single personnel and personnel with a high school education or less were more than two times greater than for married personnel with spouse present and college graduates, respectively. These logistic regression analyses suggest that prevention efforts for heavy alcohol use focused on lower grade enlisted male personnel in the Army, Navy, and Marine Corps, as well as on single personnel and personnel with a high school education or less, are likely to be most productive.

4.4 Negative Effects of Alcohol Use

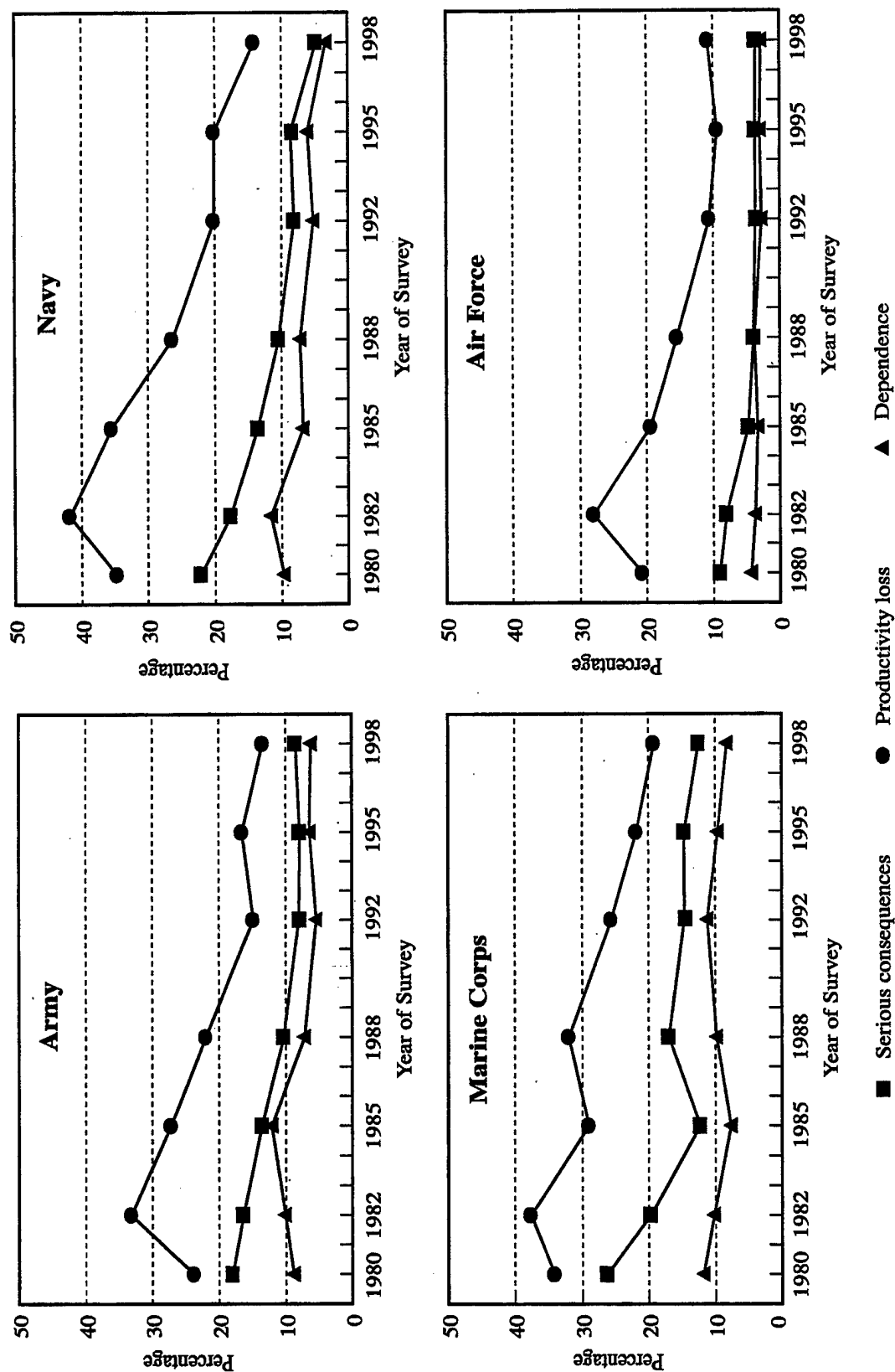
In this section, we examine the negative effects of alcohol consumption on military personnel. First, we examine trends in negative effects and contrast findings from the 1980 to the 1998 DoD surveys. Next, we examine the negative effects as a function of pay grade and the relationship between drinking levels and serious consequences. We measured alcohol use's negative effects in terms of any serious consequences, productivity loss, and dependence symptoms.

Examination of the trends in alcohol related negative effects during the 18-year period from 1980 to 1998 reveal (Table 3) that alcohol-related negative effects declined significantly from 1980 to 1998. In 1998, 6.7% of all military personnel experienced at least one alcohol-related serious consequence, 13.6% had some alcohol-related productivity loss, and 4.8% showed signs of alcohol dependence.

Figure 2 shows that the reductions in negative effects that were observed for the total DoD also occurred among personnel in each of the Services. Although there was some fluctuation, we found a general decline in serious consequences, productivity loss, and dependence symptoms over the survey years among each of the Services.

Because those in lower pay grades are more likely to drink heavily, we might expect a similar distribution for negative effects of alcohol use. Examination of pay grade differences found that alcohol-related serious consequences, productivity loss, and

Figure 2. Trends in Alcohol-Related Negative Effects, by Service, 1980-1998



Note: Definitions and measures of substance use are given in Section 2.2.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1980-1998 (1998 Questions: Serious Consequences, Q34 and 36; Productivity Loss, Q32A-F; Dependence Symptoms, Q33A-C and E-F).

dependence symptoms were substantially higher among the E1 to E3 pay grades than among other pay grades (Table 11).

The high prevalence of alcohol problems among junior enlisted personnel indicate that these pay grades are at substantially greater risk of experiencing negative effects when they drink, relative to other pay grades. In addition, because most negative effects of alcohol use occur among these junior enlisted personnel, the absolute numbers of personnel having these drinking problems are quite large, requiring substantial resources to reduce the impact of so many personnel experiencing these negative effects.

To better understand the influence of drinking levels on negative effects of alcohol use, we examined the relationship between drinking levels (omitting abstainers) and the percentage of personnel with one or more alcohol-related serious consequences, any reported loss of productivity, or occurrence of one or more dependence symptoms. Table 12 shows that negative effects of alcohol use were experienced by heavy drinkers at rates 4 times (productivity loss) to 11 times (dependence symptom) higher than by military personnel who drank at only moderate or lighter levels.

4.5 Participation in Counseling and Treatment Programs

Few military personnel reported actually receiving treatment for an alcohol problem since joining the Military. For all Services, almost all of the personnel treated for an alcohol-related problem received their treatment through a military treatment program or facility than through any kind of civilian medical facilities or treatment programs. Table 13 shows the following:

- Only 4.9% of all military personnel who used alcohol at the infrequent/light level reported that they had received treatment for an alcohol problem since joining the Military; however, 13.8% of current heavy alcohol users had a history of alcohol treatment.
- Treatment rates are closely tied to alcohol use levels. The prevalence of heavy alcohol use was relatively low in the Air Force compared to the other Services; however, among moderate to heavy users of alcohol in the Air Force, rates of having been treated for an alcohol problem were very similar to those for persons drinking at the same levels in the other Services. Such a finding focuses attention on the fact that persons using alcohol at this high level participated in treatment at about the same rate regardless of Service.

These heavy alcohol users who reported that they had received treatment may constitute a group at highest risk of needing future treatment. It is notable, however, that the Marine Corps, with the highest prevalence of heavy alcohol use, had the lowest rate of participation in treatment.

Table 11. Negative Effects of Alcohol Use, Past 12 Months, by Pay Grade

Measure/Pay Grade	Service				Total DoD
	Army	Navy	Marine Corps	Air Force	
Serious Consequences					
E1-E3	17.5 (1.9)	10.7 (1.6)	21.5 (1.3)	9.8 (1.1)	15.2 (0.9)
E4-E6	9.5 (1.0)	4.9 (0.5)	10.4 (1.2)	3.1 (0.3)	6.5 (0.4)
E7-E9	2.3 (0.6)	2.4 (0.7)	2.8 (0.7)	2.2 (0.5)	2.3 (0.3)
W1-W5	1.2 (0.5)	** (**)	1.7 (1.4)	NA (NA)	1.1 (0.4)
O1-O3	2.1 (0.7)	1.3 (0.5)	1.9 (0.7)	0.9 (0.5)	1.5 (0.3)
O4-O10	0.1 (0.1)	0.3 (0.3)	0.8 (0.5)	** (**)	0.2 (0.1)
Productivity Loss					
E1-E3	20.4 (2.1)	19.8 (2.7)	25.3 (1.4)	17.8 (1.8)	20.7 (1.1)
E4-E6	15.1 (1.1)	15.3 (1.6)	19.3 (1.6)	11.3 (1.4)	14.6 (0.7)
E7-E9	5.6 (0.7)	8.0 (1.0)	7.5 (1.2)	7.1 (1.1)	6.8 (0.5)
W1-W5	5.8 (1.3)	5.1 (2.7)	4.2 (1.3)	NA (NA)	5.5 (1.0)
O1-O3	8.0 (1.2)	11.1 (2.4)	13.4 (2.3)	7.1 (1.1)	8.9 (0.9)
O4-O10	5.3 (1.0)	5.6 (1.1)	5.1 (1.0)	5.0 (0.9)	5.2 (0.5)
Dependence Symptoms					
E1-E3	11.6 (1.3)	8.0 (1.3)	14.4 (1.3)	6.1 (1.8)	10.2 (0.8)
E4-E6	7.1 (0.8)	3.3 (0.5)	6.7 (1.0)	2.7 (0.5)	4.7 (0.4)
E7-E9	2.0 (0.5)	1.8 (0.4)	1.2 (0.4)	1.7 (0.7)	1.8 (0.3)
W1-W5	0.8 (0.4)	** (**)	0.5 (0.5)	NA (NA)	0.7 (0.3)
O1-O3	1.5 (0.8)	1.0 (0.5)	1.4 (0.7)	1.3 (0.4)	1.3 (0.3)
O4-O10	0.5 (0.3)	** (**)	** (**)	0.6 (0.4)	0.4 (0.2)

Note: Table entries are percentages (with standard errors in parentheses). Definitions and measures of substance use are given in Section 2.2.

NA = Not applicable.

**Estimate rounds to zero.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Serious Consequences, Q34 and 36; Productivity Loss, Q32A-F, Dependence Symptoms, Q33A-C and E-F).

Table 12. Negative Effects of Alcohol Use, by Drinking Level

Drinking Level	Serious Consequences	Productivity Loss	Dependence Symptoms
Infrequent/Light	3.4 (0.5)	5.4 (0.5)	1.6 (0.3)
Moderate	3.6 (0.6)	8.6 (0.7) ^a	0.9 (0.2)
Moderate/Heavy	6.7 (0.6) ^{a,c}	21.1 (1.1) ^{a,c}	4.1 (0.4) ^{a,c}
Heavy	23.8 (1.2) ^{a,b,c}	38.7 (1.4) ^{a,b,c}	21.6 (1.1) ^{a,b,c}

Note: Table entries are percentages (with standard errors are in parentheses) of personnel in each drinking level who had one or more of the alcohol-related problems mentioned. Definitions and measures of substance use are given in Section 2.2.

^aSignificantly higher than for moderate drinkers.

^bSignificantly higher than for moderate/heavy drinkers.

^cSignificantly higher than for infrequent/light drinkers.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Serious Consequences, Q34 and 36, Productivity Loss, Q32A-F, Dependence Symptoms, Q33A-C and E-F; Drinking Level, Q15-18 and 20-23).

4.6 Military and Civilian Comparisons

Results of standardized comparisons of heavy alcohol use among military personnel and civilians are presented in Table 14. Data for civilians are *standardized* estimates based on data from the 1997 National Household Survey on Drug Abuse (NHSDA). Thus, the standardized civilian estimates presented here may differ from any published NHSDA estimates for 1997 (e.g., OAS, 1998b). Data for military personnel are U.S.-based population estimates (including personnel stationed in Alaska and Hawaii) from the 1998 DoD survey. Because the military estimates for Table 14 have been subsetted to U.S.-based personnel, they may not match the estimates in earlier tables, which are based on the entire military population.

We compared military and civilian rates of heavy alcohol use and found the following (Table 14):

- Military personnel overall and military men in particular were significantly more likely to drink heavily than were their civilian counterparts (14.2% of all military personnel vs. 9.9% of civilians; 16.0% of military men vs. 11.0% of civilian men). The prevalence of heavy alcohol use among females in the total DoD and in every Service except the Navy was not significantly different from heavy alcohol use by civilian women.

Table 13. Participation in Alcohol Treatment Since Joining the Military and Negative Effects of Alcohol Use, by Drinking Level and Service

Service/Alcohol Treatment and Negative Effects	Drinking Level			
	Abstainer	Infrequent Light	Moderate	Moderate Heavy Heavy
Army				
No treatment	96.2 (0.7)	94.4 (1.0)	94.5 (1.3)	92.6 (1.3)
Any military alcohol treatment	3.7 (0.7)	5.0 (0.9)	4.6 (1.1)	6.6 (1.3)
Any civilian alcohol treatment	0.6 (0.3)	1.0 (0.4)	1.1 (0.6)	1.9 (0.5)
Military or civilian alcohol treatment	3.8 (0.7)	5.6 (1.0)	5.5 (1.3)	7.4 (1.3)
				86.3 (1.4)
				11.9 (1.3)
				2.6 (0.8)
				13.7 (1.4)
Navy				
No treatment	91.2 (1.2)	94.3 (0.6)	93.1 (1.7)	88.2 (1.5)
Any military alcohol treatment	8.2 (1.2)	5.1 (0.6)	6.7 (1.7)	10.9 (1.6)
Any civilian alcohol treatment	0.7 (0.4)	0.7 (0.4)	0.6 (0.4)	1.7 (0.5)
Military or civilian alcohol treatment	8.8 (1.2)	5.7 (0.6)	6.9 (1.7)	11.8 (1.5)
				85.5 (2.5)
				13.8 (2.6)
				1.3 (0.5)
				14.5 (2.5)
Marine Corps				
No treatment	95.6 (1.0)	93.7 (0.8)	95.2 (0.9)	92.4 (1.2)
Any military alcohol treatment	4.2 (1.0)	6.2 (0.8)	4.3 (0.9)	7.1 (1.1)
Any civilian alcohol treatment	1.2 (0.4)	0.8 (0.5)	0.9 (0.5)	1.2 (0.3)
Military or civilian alcohol treatment	4.4 (1.0)	6.3 (0.8)	4.8 (0.9)	7.6 (1.2)
				88.0 (1.6)
				11.4 (1.5)
				2.0 (0.6)
				12.0 (1.6)
Air Force				
No treatment	96.2 (0.7)	97.1 (0.5)	93.6 (0.8)	91.8 (1.1)
Any military alcohol treatment	3.5 (0.7)	2.7 (0.5)	5.9 (0.8)	7.8 (1.0)
Any civilian alcohol treatment	0.6 (0.2)	0.7 (0.3)	0.9 (0.4)	0.8 (0.3)
Military or civilian alcohol treatment	3.8 (0.7)	2.9 (0.5)	6.4 (0.8)	8.2 (1.1)
				85.3 (2.1)
				13.7 (2.0)
				1.3 (0.6)
				14.7 (2.1)
Total DoD				
No treatment	94.9 (0.5)	95.1 (0.4)	94.0 (0.7)	91.2 (0.7)
Any military alcohol treatment	4.9 (0.5)	4.5 (0.4)	5.5 (0.6)	8.1 (0.7)
Any civilian alcohol treatment	0.7 (0.2)	0.8 (0.2)	0.9 (0.2)	1.5 (0.2)
Military or civilian alcohol treatment	5.1 (0.5)	4.9 (0.4)	6.0 (0.7)	8.8 (0.7)
				13.8 (0.9)
Serious Consequences	NA	3.4 (0.5)	3.6 (0.6)	6.7 (0.6) ^{a,c}
				23.8 (1.2) ^{a,b,c}
Productivity Loss	NA	5.4 (0.5)	8.6 (0.7) ^a	21.1 (1.1) ^{a,c}
				38.7 (1.4) ^{a,b,c}
Dependence Symptoms	NA	1.6 (0.3)	0.9 (0.2)	4.1 (0.4) ^{a,c}
				21.6 (1.1) ^{a,b,c}

Note: Table entries are percentages (with standard errors in parentheses). Estimates have not been adjusted for sociodemographic differences among Services. Definitions and measures of substance use are given in Section 2.2.

NA = Not applicable.

^aSignificantly higher than for moderate drinkers.

^bSignificantly higher than for moderate/heavy drinkers.

^cSignificantly higher than for infrequent/light drinkers.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Alcohol Treatment Since Joining the Service, Q41; Drinking Level, Q15-18 and 20-23; Serious Consequences, Q34 and 36, Productivity Loss, Q32A-F, Dependence Symptoms, Q33A-C and E-F).

Table 14. Standardized Comparisons of the Prevalence of Heavy Alcohol Use, Past 30 Days, Among Military Personnel and Civilians for Persons Aged 18 to 55

Gender/Age Group	Civilian ^a	Comparison Population				
		Total DoD	Army	Navy	Marine Corps	Air Force
Males	N=5,956	N=9,338	N=2,647	N=1,916	N=2,436	N=2,339
18-25	14.9 (1.1)	26.9 (1.6) ^b	27.7 (2.7) ^b	24.5 (5.0)	31.0 (2.8) ^b	23.2 (2.7) ^b
26-55	8.7 (0.9)	9.8 (0.8)	11.2 (1.5)	9.6 (2.1)	10.7 (1.2)	8.3 (0.7)
All ages	11.0 (0.7)	16.0 (1.0) ^b	18.3 (1.7) ^b	13.1 (2.4)	22.4 (2.6) ^b	12.5 (1.1)
Females	N=8,179	N=3,214	N=947	N=922	N=505	N=840
18-25	3.9 (0.7)	5.7 (0.7)	4.8 (1.2)	7.3 (1.1) ^b	7.3 (1.4)	5.4 (1.2)
26-55	1.4 (0.3)	1.9 (0.4)	1.5 (0.7)	2.6 (0.8)	3.8 (1.4)	1.7 (0.6)
All ages	2.5 (0.4)	3.6 (0.4)	3.0 (0.7)	4.4 (0.6) ^b	5.9 (1.2)	3.2 (0.6)
Total	N=14,135	N=12,552	N=3,594	N=2,838	N=2,941	N=3,179
18-25	13.2 (0.9)	23.4 (1.5) ^b	24.3 (2.3) ^b	21.0 (4.3)	29.4 (2.9) ^b	18.9 (2.3) ^b
26-55	7.8 (0.8)	8.8 (0.7)	9.8 (1.3)	8.8 (2.0)	10.3 (1.2)	7.3 (0.6)
All ages	9.9 (0.6)	14.2 (0.9) ^b	16.1 (1.5) ^b	12.0 (2.2)	21.4 (2.6) ^b	10.8 (1.0)

Note: Table entries are percentages (with standard errors in parentheses). Civilian data have been standardized to the U.S.-based military data by gender, age, education, race/ethnicity, and marital status. Data for the total DoD and the individual Services are U.S.-based population estimates (including personnel in Alaska and Hawaii). N's show the number of cases on which the weighted estimates are based. Estimates have not been adjusted for sociodemographic differences among Services.

^aDefined as consumption of five or more drinks on the same occasion on 4 or more days in the past 30 days.

^bSignificantly different from civilian estimate at the .05 significance level.

Civilian data source: National Household Survey on Drug Abuse, 1997.

Military data source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Heavy Alcohol Use, Past 30 Days, Q15-18 and 20-23).

- Differences in military and civilian heavy alcohol use rates were greatest for young men aged 18 to 25. Among young men, the rate of heavy alcohol use for the Military was about 1.8 times higher than the rate for civilians (26.9% vs. 14.9%).
- The Army and Marine Corps showed the same pattern as the total DoD with rates of heavy alcohol use among military personnel higher than among civilians. Except for young men, Air Force gender/age subgroup rates of heavy alcohol use did not differ from civilian rates.

The higher rates of heavy alcohol use among military personnel remained after we controlled for differences in the sociodemographic composition of military and civilian populations. Although military personnel were more likely to be young and male, rates of heavy alcohol use were significantly higher than among civilians even when we took such differences into account.

5. ILLICIT DRUG USE

In this chapter, we examine illicit drug use among military personnel, including trends in use, Service comparisons of illicit drug use, prevalence of the use of specific drugs and classes of drugs, correlates of illicit drug use, the relationship of illicit drug use to productivity loss, and the relationship of drug use to drug testing history and predictability of last drug test. We also compare these findings to prior surveys of military and civilian populations.

5.1 Trends in Illicit Drug Use

Drug use declined steadily during the 1980s and continued to decline in the 1990s for military personnel. Drug use among military personnel in 1998 was the lowest since the survey series began. Table 15 presents trends in the prevalence of illicit drug use for the total DoD and each of the Services during the past 30 days and 12 months prior to when each survey was administered. Because the patterns for use in the past 30 days and past 12 months were highly similar, except that the 12-month data were correspondingly higher, we focus our discussion here on the 30-day or current drug use.

Illicit drug use among military personnel declined dramatically between 1980 and 1998, showing a significant decrease in the prevalence of drug use of over 90% in 18 years. As shown in Table 15,

- use of any illicit drugs decreased from 27.6% in the past 30 days in 1980 to 2.7% in 1998 among the total DoD;
- all Services showed the same pattern of decreases from 1980 to 1998 observed for total DoD for illicit drug use in the past 30 days; and
- the Navy was the only Service that had a significant decline in past 30-day drug use between 1995 and 1998 (3.6% to 1.8%).

Throughout the survey series, the Air Force consistently showed the lowest rates of use. In 1998, all of the Services were either at the lowest level for the survey series or were at comparable levels to those observed in 1992.

The demographics of Marine Corps personnel may place them at higher risk of drug use (i.e., they have a higher proportion of young personnel, single males, E1 to E3 pay grades, and those with a high school education or less). Despite these demographics, Marine Corps drug use rates were not consistently higher than the other Services. Thus, despite the potential for higher use, the Marine Corps has been able to contain drug use to comparable levels with the Army and Navy.

Table 15. Trends in Any Illicit Drug Use, Past 30 Days and Past 12 Months, by Service, 1980-1998

Service/Period of Use	Year of Survey						
	1980	1982	1985	1988	1992	1995	1998
Army							
Past 30 days	30.7 (2.8)	26.2 (1.8)	11.5 (1.3) ^a	6.9 (0.7) ^a	3.9 (0.8) ^a	4.0 (0.9)	4.5 (0.8) ^b
Past 12 months	39.4 (2.9)	32.4 (1.8) ^a	16.6 (1.3) ^a	11.8 (1.1) ^a	7.7 (0.8) ^a	9.2 (1.1)	9.8 (0.9) ^b
Navy							
Past 30 days	33.7 (2.1)	16.2 (2.2) ^a	10.3 (1.7) ^a	5.4 (0.7) ^a	4.0 (0.9)	3.6 (0.6)	1.8 (0.3) ^{a,b}
Past 12 months	43.2 (2.1)	28.1 (1.7) ^a	15.9 (2.3) ^a	11.3 (2.1)	6.6 (1.9)	7.3 (0.8)	4.2 (0.5) ^{a,b}
Marine Corps							
Past 30 days	37.7 (3.0)	20.6 (2.0) ^a	9.9 (3.2) ^a	4.0 (0.7)	5.6 (1.0)	3.6 (0.8)	3.3 (0.4) ^b
Past 12 months	48.0 (3.1)	29.9 (3.2) ^a	14.7 (3.8) ^a	7.8 (1.0)	10.7 (1.3)	7.3 (1.2)	7.2 (0.8) ^b
Air Force							
Past 30 days	14.5 (1.1)	11.9 (1.5)	4.5 (0.8) ^a	2.1 (0.4) ^a	1.2 (0.2) ^a	1.0 (0.2)	1.2 (0.1) ^b
Past 12 months	23.4 (1.7)	16.4 (1.8) ^a	7.2 (0.9) ^a	3.8 (0.6) ^a	2.3 (0.3) ^a	2.5 (0.4)	2.4 (0.2) ^b
Total DoD							
Past 30 days	27.6 (1.5)	19.0 (1.0) ^a	8.9 (0.8) ^a	4.8 (0.3) ^a	3.4 (0.4) ^a	3.0 (0.3)	2.7 (0.3) ^b
Past 12 months	36.7 (1.5)	26.6 (1.0) ^a	13.4 (1.0) ^a	8.9 (0.8) ^a	6.2 (0.6) ^a	6.5 (0.5)	6.0 (0.4) ^b

Note: Table entries are percentages (with standard errors in parentheses). Estimates have not been adjusted for sociodemographic differences among Services. Definitions and measures of substance use are given in Section 2.2.

^aComparisons between this survey and the preceding survey are statistically significant at the 95% confidence level.

^bComparisons between 1980 and 1998 are statistically significant at the 95% confidence level.

Source: DoD Surveys of Health Related Behaviors Among Military Personnel, 1980 to 1998 (1998 Questions: Any Illicit Drug Use: Past 30 Days, Q60 and 67, Past 12 Months, Q60-61 and 67).

The decline in drug use among military personnel suggests that there may be a broader societal trend of reduction in drug use, as well as evidence of the effectiveness of military policies and programs directed toward reducing or eliminating drug use.

5.2 Service Comparisons of Illicit Drug Use

Unadjusted and adjusted estimates of drug use for each of the Services were computed to assess the effects of sociodemographic composition on drug use rates. The unadjusted estimates are the observed past 12-month prevalence rates in 1998 and provide a perspective on the comparative magnitude of the challenge facing the Services in their effort to eradicate drug use. The adjusted estimates allow for comparisons across the Services by standardizing for sociodemographic differences. Table 16 displays the unadjusted and adjusted estimates of past 12-month drug use for each Service.

- Comparisons of unadjusted 12-month estimates showed that the rate of any illicit drug use during past year was lowest among Air Force (2.4%) and Navy (4.2%) personnel and that the rate was similar among personnel in the Army (9.8%) and Marine Corps (7.2%).
- The difference in the unadjusted 12-month estimates in each drug use category between the Air Force and each of the other Services was statistically significant. Additionally, the Navy's estimates were significantly lower than those for the Army and the Marine Corps.
- After adjusting for demographic differences among the Services, the Marine Corps' drug use estimates were significantly lower than the Army's, but higher than the Air Force's. The Marine Corps' rates became nearly equal to the Navy's after the adjustment, where the unadjusted rates were significantly higher. In view of the demographic profile of the Marine Corps, which makes its personnel at higher risk for drug use, these findings suggest that the Marine Corps' efforts to combat drug use have been more effective than those of the Army.

Overall, these findings suggest that differences among the Services in sociodemographic composition remain viable as a partial explanation for some differences we observed in drug use, particularly between the Marine Corps and the other Services. Clearly, this explanation does not account for all observed differences in drug use among the Services. The standardizations conducted here controlled for Service differences in gender, age, education, race/ethnicity, and marital status, but they may not have controlled for all important differentiating factors. Alternative explanations accounting for observed differences are that the Services may vary in policies and practices associated with controlling drug use or that personnel across the Services have different attitudes and values regarding drug use.

Table 16. Estimates of Illicit Drug Use, Past 12 Months, Unadjusted and Adjusted for Sociodemographic Differences, by Service

Drug/Type of Estimate	Service								Total DoD	
	Army		Navy		Marine Corps		Air Force			
Marijuana										
Unadjusted	7.7	(0.9) ^{a,b,d}	2.5	(0.4) ^{a,d}	5.2	(0.7) ^a	1.1	(0.1)	4.2	(0.4)
Adjusted ^c	7.0	(0.6) ^{a,b,d}	3.2	(0.3) ^a	3.2	(0.3) ^a	1.3	(0.3)	4.2	(0.4)
Any Illicit Drug Except Marijuana ^e										
Unadjusted	4.9	(0.5) ^{a,b}	2.8	(0.4) ^{a,d}	4.5	(0.5) ^a	1.8	(0.2)	3.4	(0.2)
Adjusted ^c	4.6	(0.4) ^{a,b,d}	3.2	(0.4) ^a	3.0	(0.2) ^a	2.1	(0.3)	3.4	(0.2)
Any Illicit Drug ^f										
Unadjusted	9.8	(0.9) ^{a,b,d}	4.2	(0.5) ^{a,d}	7.2	(0.8) ^a	2.4	(0.2)	6.0	(0.4)
Adjusted ^c	9.1	(0.6) ^{a,b,d}	4.9	(0.4) ^a	4.6	(0.3) ^a	3.0	(0.3)	6.0	(0.4)

Note: Table entries are percentages (with standard errors in parentheses). Pairwise significance tests were done between all possible Service combinations (e.g., Army vs. Navy, Navy vs. Marine Corps). Definitions and measures of substance use are given in Section 2.2.

^aEstimate is significantly different from the Air Force at the 95% confidence level.

^bEstimate is significantly different from the Navy at the 95% confidence level.

^cAdjusted estimates have been standardized by gender, age, education, race/ethnicity, and marital status to the total DoD distribution.

^dEstimate is significantly different from the Marine Corps at the 95% confidence level.

^eAny nonmedical use of PCP, LSD/hallucinogens, cocaine, amphetamines/stimulants, tranquilizers, barbiturates/sedatives, heroin/other opiates, analgesics, "designer" drugs, or inhalants.

^fSame definition as "e" except marijuana is included in the set of drugs.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Marijuana, Q60A, 61A, and 67A; Any Illicit Drug Use Except Marijuana, Q60B-K, 61B-K, and 67B-K; Any Illicit Drug Use, Q60A-K, 61A-K, and 67A-K).

5.3 Prevalence of Specific Drug Use in 1998

As overall drug use has declined across survey years, use of most of the individual drugs or types of drugs considered in this survey also declined. Table 17 presents the percentage of users of 12 specific drugs or drug classes during the 30 days and 12 months before the survey for each Service and the total DoD. Two summary measures also are included, one for use of any illicit drug, and the other for use of any illicit drug except marijuana. The rates presented in this section have not been adjusted for sociodemographic differences.

In examining the prevalence of specific drugs for the individual Services, we found that marijuana remained the drug most commonly used by military personnel, with 1.4% reporting use in the past 30 days and 4.2% reporting use in the past year. The Air Force had lower rates than the other Services on the use of individual drugs. In addition,

- use of individual drugs was similar for the Army and Marine Corps on all drugs except marijuana, which was higher in the Army, and
- prevalence of use was lower among Navy personnel than both Army and Marine Corps for each individual drug.

The summary measures of any illicit drug use and any illicit drug use except marijuana show that

- 30-day use of any illicit drug was well below 5.0% and 12-month use remained under 10.0% across Services and the total DoD, and
- 30-day use of any illicit drug except marijuana was well below 3.0% and 12-month use was under 5.0% for each Service and the total DoD.

The Army had the highest 30-day and 12-month use of any illicit drug (4.5% and 9.8%, respectively) and any illicit drug use except marijuana (2.7% and 4.9%, respectively), followed by the Marine Corps, Navy, and Air Force. As noted previously, the Air Force was lower than the other Services on the use of individual drugs and thus had the lowest rates for each of the summary measures.

5.4 Correlates of Illicit Drug Use

We assessed the sociodemographic correlates of past 12-month illicit drug use using univariate descriptive prevalence analysis and multivariate logistic regression analysis (described in Chapter 2). Results of both types of analysis are presented in Table 18; column 2 presents prevalence data for the demographic groups, and column 3 shows the odds ratio from the logistic regression.

Table 17. Any Illicit Drug Use, Past 30 Days and Past 12 Months

Drug/Period of Use	Service				Total DoD	
	Army	Navy	Marine Corps	Air Force		
Marijuana						
Past 30 days	2.7 (0.8)	0.7 (0.2)	1.4 (0.3)	0.4 (0.1)	1.4 (0.3)	
Past 12 months	7.7 (0.9)	2.5 (0.4)	5.2 (0.7)	1.1 (0.1)	4.2 (0.4)	
Cocaine						
Past 30 days	0.5 (0.2)	0.3 (0.2)	0.7 (0.2)	0.1 (0.1)	0.4 (0.1)	
Past 12 months	1.4 (0.3)	0.7 (0.2)	1.6 (0.3)	0.3 (0.1)	0.9 (0.1)	
PCP						
Past 30 days	0.3 (0.1)	0.1 (0.1)	0.4 (0.1)	0.1 (0.1)	0.2 (0.1)	
Past 12 months	0.5 (0.1)	0.3 (0.1)	0.5 (0.1)	0.2 (0.1)	0.4 (0.1)	
LSD/Hallucinogens						
Past 30 days	0.7 (0.2)	0.4 (0.1)	0.8 (0.2)	0.2 (0.1)	0.5 (0.1)	
Past 12 months	2.0 (0.3)	1.0 (0.2)	2.0 (0.3)	0.4 (0.2)	1.3 (0.1)	
Amphetamines/Stimulants						
Past 30 days	0.8 (0.2)	0.3 (0.1)	1.1 (0.3)	0.2 (0.1)	0.6 (0.1)	
Past 12 months	1.4 (0.2)	0.5 (0.2)	1.6 (0.3)	0.3 (0.1)	0.9 (0.1)	
Tranquilizers						
Past 30 days	0.7 (0.2)	0.2 (0.1)	0.7 (0.2)	0.2 (0.1)	0.5 (0.1)	
Past 12 months	1.1 (0.2)	0.4 (0.1)	0.9 (0.1)	0.4 (0.1)	0.7 (0.1)	
Barbiturates/Sedatives						
Past 30 days	0.5 (0.2)	0.2 (0.1)	0.4 (0.1)	0.1 (0.1)	0.3 (0.1)	
Past 12 months	0.7 (0.2)	0.3 (0.1)	0.6 (0.1)	0.3 (0.1)	0.5 (0.1)	
Heroin/Other Opiates						
Past 30 days	0.3 (0.1)	0.1 (0.1)	0.4 (0.1)	0.1 (0.1)	0.2 (**)	
Past 12 months	0.5 (0.1)	0.2 (0.1)	0.6 (0.1)	0.1 (0.1)	0.3 (0.1)	
Analgesics						
Past 30 days	1.1 (0.2)	0.8 (0.2)	0.7 (0.1)	0.4 (0.1)	0.8 (0.1)	
Past 12 months	1.7 (0.3)	1.0 (0.2)	1.1 (0.1)	0.8 (0.2)	1.2 (0.1)	
Inhalants						
Past 30 days	0.8 (0.1)	0.4 (0.1)	0.7 (0.2)	0.1 (0.1)	0.5 (0.1)	
Past 12 months	1.2 (0.2)	0.5 (0.1)	1.2 (0.2)	0.4 (0.1)	0.8 (0.1)	
"Designer" Drugs						
Past 30 days	0.7 (0.2)	0.3 (0.1)	0.7 (0.1)	0.1 (0.1)	0.4 (0.1)	
Past 12 months	1.2 (0.2)	0.5 (0.2)	1.3 (0.3)	0.3 (0.1)	0.8 (0.1)	
Any Illicit Drug^a						
Past 30 days	4.5 (0.8)	1.8 (0.3)	3.3 (0.4)	1.2 (0.1)	2.7 (0.3)	
Past 12 months	9.8 (0.9)	4.2 (0.5)	7.2 (0.8)	2.4 (0.2)	6.0 (0.4)	
Any Illicit Drug Except Marijuana^b						
Past 30 days	2.7 (0.4)	1.6 (0.3)	2.6 (0.3)	0.9 (0.1)	1.9 (0.2)	
Past 12 months	4.9 (0.5)	2.8 (0.4)	4.5 (0.5)	1.8 (0.2)	3.4 (0.2)	
Anabolic Steroids						
Past 30 days	0.5 (0.1)	0.3 (0.2)	0.7 (0.2)	0.2 (0.1)	0.4 (0.1)	
Past 12 months	0.8 (0.2)	0.6 (0.2)	0.9 (0.2)	0.3 (0.1)	0.6 (0.1)	

Note: Table entries are percentages (with standard errors in parentheses). Estimates have not been adjusted for sociodemographic differences among Services. Definitions and measures of substance use are given in Section 2.2.

**Estimate rounds to zero.

^aNonmedical use one or more times of any of the above classes of drugs (steroids excluded).

^bNonmedical use one or more times of any of the above classes of drugs, excluding marijuana (steroids also excluded).

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Illicit Drug Use, Past 30 Days, Q60 and 67; Past 12 Months, Q60-61 and 67).

Table 18. Demographic Correlates of Any Illicit Drug Use, Past 12 Months, Total DoD

Sociodemographic Characteristic	Prevalence	Adjusted Odds Ratio^a	95% CI of Odds Ratio^b
Service			
Army	9.8 (0.9)	3.65 ^c	(2.84, 4.69)
Navy	4.2 (0.5)	1.69 ^c	(1.24, 2.30)
Marine Corps	7.2 (0.8)	1.71 ^c	(1.32, 2.22)
Air Force	2.4 (0.2)	1.00	NA
Gender			
Male	6.2 (0.4)	1.54 ^c	(1.25, 1.88)
Female	4.6 (0.3)	1.00	NA
Race/Ethnicity			
Caucasian, non-Hispanic	5.6 (0.4)	1.00	NA
African American, non-Hispanic	6.8 (0.7)	1.02	(0.82, 1.27)
Hispanic	7.6 (0.8)	0.98	(0.77, 1.26)
Other	4.8 (0.8)	0.81	(0.60, 1.09)
Education			
High school or less	10.2 (0.8)	2.25 ^c	(1.25, 4.06)
Some college	5.3 (0.4)	1.91 ^c	(1.09, 3.34)
College graduate or higher	1.6 (0.2)	1.00	NA
Age			
20 or younger	15.9 (1.3)	4.11 ^c	(2.50, 6.75)
21-25	10.1 (0.8)	3.56 ^c	(2.36, 5.36)
26-34	3.3 (0.3)	1.76 ^c	(1.25, 2.48)
35 or older	1.3 (0.2)	1.00	NA
Family Status^e			
Not married	9.7 (0.6)	1.63 ^c	(1.26, 2.12)
Married, spouse not present	6.1 (1.4)	1.21	(0.77, 1.88)
Married, spouse present	3.2 (0.4)	1.00	NA
Pay Grade			
E1-E3	14.0 (1.0)	1.98	(0.81, 4.85)
E4-E6	5.6 (0.4)	1.28	(0.55, 2.97)
E7-E9	1.5 (0.2)	0.83	(0.40, 1.76)
W1-W5	0.8 (0.4)	0.28 ^c	(0.08, 0.98)
O1-O3	2.1 (0.4)	1.12	(0.54, 2.30)
O4-O10	0.9 (0.3)	1.00	NA
Region			
CONUS ^e	5.8 (0.5)	0.94	(0.76, 1.15)
OCONUS ^f	6.6 (0.7)	1.00	NA
Total	6.0 (0.4)	NA	NA

Note: Prevalence estimates are percentages (with standard errors in parentheses). Definitions and measures of substance use are given in Section 2.2.

NA= Not applicable.

^aOdds ratios were adjusted for Service, gender, race/ethnicity, education, age, family status, pay grade, and region.

^b95% CI = 95% confidence interval of the odds ratio.

^cOdds ratio is significantly different from the reference group.

^dEstimates by family status in 1998 are not strictly comparable to those from other survey years. In 1998, personnel who reported that they were living as married were classified in the "not married" group. In prior years, the marital status question did not distinguish between personnel who were married and those who were living as married.

^eRefers to personnel stationed within the 48 contiguous States in the continental United States.

^fRefers to personnel stationed outside the continental United States or aboard afloat ships.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Any Illicit Drug Use, Past 12 Months, Q60-61 and 67; refer to Section 2.2 for descriptions of sociodemographic variables).

Illicit drug use was related to a number of sociodemographic factors (see Table 18). Logistic regression analysis showed that Service, gender, education, age, family status, and pay grade were significantly related to the probability of any drug use in the past 12 months. Specifically, after adjusting for other variables in the model, the probability of any illicit drug use was significantly higher among the following:

- Army, Marine Corps, and Navy personnel compared with Air Force personnel;
- males compared with females;
- high school graduates or nongraduates, and those with some college, compared with college graduates;
- younger personnel compared with older personnel; and
- those who were not married compared with those who were married with their spouse present.

In addition, drug use among warrant officers was especially low after adjusting for other variables in the model. Age and Service showed the strongest effects in the model. Younger personnel under the age of 20 had the highest odds of using drugs; odds in this age group were more than four times that of those older than 35 years. Those aged 21 to 25 had the next highest odds of using drugs, nearly 3.5 times of personnel aged 35 or older. Similarly, the odds for drug use were higher for Army personnel (3.6) compared to Air Force personnel. Being in the Navy or Marine Corps compared to the Air Force, and being between the age of 26 and 34 compared to older than 35, all increased odds approximately 1.7. This logistic regression analysis suggests that drug use prevention efforts should focus on younger personnel primarily in the Army, Navy, and Marine Corps.

The logistic findings differed slightly from the descriptive results in that the multivariate analysis showed minimal effects for pay grade, whereas the descriptive analysis showed a more pronounced effect. Pay grade may thus be correlated with other variables in the model (e.g., age, family status, education), such that when all of the demographic and Service variables were examined simultaneously in a single analysis, few effects were attributable to pay grade.

Although age was a significant predictor of drug use in the model but pay grade was not, readers should not conclude that illicit drug use is not a problem among personnel in lower pay grade groups. As shown in column 2 of Table 18, 14.0% of personnel in the E1 to E3 pay grades used illicit drugs in the past 12 months. Because age and pay grade were most likely to be overlapping variables, we conducted a separate analysis that omitted age as a predictor variable in the logistic regression analysis. The results showed a strong

effect for pay grade similar to the pattern in the prevalence data. Thus, the association between age and pay grade (i.e., younger personnel tending to be in the lower pay grades) explains why pay grade did not emerge as a strong predictor of illicit drug use in the logistic regression model when other demographic factors were taken into account, including age.

5.5 Illicit Drug Use and Productivity Loss

We also examined the relationship between illicit drug use and productivity loss. Indicators of productivity loss that were examined were being late for work, leaving work early, being hurt in an on-the-job accident, working below one's normal level of performance, and not coming to work because of illness or injury.

Table 19 presents the number of work days affected in the past year by the productivity loss indicators for all DoD personnel, for those reporting any illicit drug use during the past 12 months, and for those reporting any illicit drug use except marijuana during the past 12 months. Examination of the table shows that

- military personnel who used any illicit drugs or any drug except marijuana were more likely than all DoD personnel to report productivity loss from work, and that
- compared with the total DoD, a higher percentage of those who used any illicit drug or any illicit drug except marijuana reported one of the productivity loss indicators on 4 or more days in the past year.

The percentage of those who reported 4 or more work days affected by the productivity loss indicators was higher among both drug use categories than the total DoD. Most notable of the productivity loss indicators, over 25% of those in both drug use categories reported leaving work early on 4 or more days in the past year compared to approximately 16% of both drug use categories. Approximately 30% of those in both drug use categories reported working below normal performance level on 4 or more days, compared to less than 20% of the total DoD. Conversely, the total DoD showed a higher percentage of those who reported productivity loss on no days in the past year than those who reported illicit drug use and illicit drug use except marijuana.

These data provide some evidence that illicit drug use affects productivity and performance and thus results in lost time from work and military duties. It also suggests that these indicators may be a red flag to indicate possible substance abuse problems by military personnel. That is, if personnel have an excessive number of occurrences of being late for work, leaving early, or working below their normal levels, drug use is one possible explanation. Caution, of course, must be used before making this conclusion because other reasons could explain these behaviors.

Table 19. Any Illicit Drug Use and Productivity Loss, Past 12 Months, Total DoD

Group/Problem	N	Number of Work Days Affected, Past 12 Months				
		No Days	1 Day	2 or 3 Days	4 or More Days	Any Number of Days
All Personnel	17,264					
Late for work by 30 minutes or more		73.4 (0.7)	11.1 (0.3)	9.8 (0.3)	5.7 (0.3)	26.6 (0.7)
Left work early		64.2 (0.7)	7.5 (0.3)	12.6 (0.4)	15.8 (0.5)	35.8 (0.7)
Hurt in an on-the-job accident		90.4 (0.6)	5.8 (0.3)	2.6 (0.2)	1.2 (0.1)	9.6 (0.6)
Worked below normal performance level		66.4 (0.6)	5.7 (0.2)	10.2 (0.3)	17.7 (0.5)	33.6 (0.6)
Did not come into work because of illness or injury		77.4 (0.7)	7.8 (0.3)	8.6 (0.4)	6.3 (0.3)	22.6 (0.7)
Any Illicit Drug Use Past 12 Months	814 ^a					
Late for work by 30 minutes or more		60.2 (2.4)	15.4 (1.9)	11.5 (1.3)	13.0 (1.4)	39.8 (2.4)
Left work early		53.4 (1.5)	7.6 (1.2)	13.1 (1.6)	25.9 (1.6)	46.6 (1.5)
Hurt in an on-the-job accident		79.8 (1.6)	10.6 (1.1)	5.9 (1.3)	3.7 (0.6)	20.2 (1.6)
Worked below normal performance level		52.1 (2.0)	7.1 (1.0)	11.9 (1.8)	28.9 (1.7)	47.9 (2.0)
Did not come into work because of illness or injury		73.2 (2.0)	6.5 (0.9)	10.4 (1.4)	9.9 (1.1)	26.8 (2.0)
Any Illicit Drug Use Except Marijuana, Past 12 Months	507 ^b					
Late for work by 30 minutes or more		61.1 (2.5)	16.6 (2.4)	12.6 (1.8)	9.7 (1.7)	38.9 (2.5)
Left work early		51.3 (2.5)	8.1 (1.7)	13.8 (1.9)	26.8 (3.0)	48.7 (2.5)
Hurt in an on-the-job accident		77.8 (2.3)	10.8 (1.7)	6.4 (1.6)	5.0 (1.1)	22.2 (2.3)
Worked below normal performance level		50.3 (2.9)	6.6 (1.4)	12.5 (2.2)	30.6 (2.6)	49.7 (2.9)
Did not come into work because of illness or injury		70.6 (2.5)	7.7 (1.5)	8.3 (1.4)	13.4 (1.8)	29.4 (2.5)

Note: Table entries are percentages (with standard errors in parentheses). Definitions and measures of substance use are given in Section 2.2.

^aUnweighted number of respondents in the total DoD sample who reported any nonmedical use of marijuana, PCP, LSD/hallucinogens, cocaine, amphetamines/stimulants, tranquilizers, barbiturates/sedatives, heroin/other opiates, analgesics "designer" drugs, or inhalants.

^bUnweighted number of respondents in the total DoD sample who reported any nonmedical use of PCP, LSD/hallucinogens, cocaine, amphetamines/stimulants, tranquilizers, barbiturates/sedatives, heroin/other opiates, analgesics, "designer" drugs, or inhalants.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Productivity Loss, Q69A-E; Any Illicit Drug Use, Q60A-K, 61A-K, and 67A-K; Any Illicit Drug Use Except Marijuana, Q60B-K, 61B-K, and 67B-K).

5.6 Illicit Drug Use and Drug Testing

Drug testing is used to deter and detect drug use among military personnel. Analyses examined the association of past 12-month drug use and drug-testing experience among military personnel (Tables 20 and 21).

- Virtually all Military personnel (98.8%) had been tested for drugs at some point since joining the Service. Past 12-month drug use was not associated with the recency of the test for any of the Services or the total DoD. Overall, 87.4% of personnel reported being tested within the past 12 months. Marine Corps personnel (93.9%) and Army personnel (93.5%) reported the highest rates of testing in the past 12 months, followed by personnel in the Navy (89.7%) and the Air Force (74.8%). There were few differences among testing rates for drug users and nonusers.
- A majority of military personnel (63.0%) reported that it was very hard to predict the time of their last drug test. This estimate varied, however, by Service. The Navy (74.7%) and the Air Force (76.1%) had the highest percentages of personnel reporting that it was very hard to predict when they were last going to be tested for drug use, followed by the Army (49.1%) and the Marine Corps (47.0%). Results for the Navy are consistent with the recent implementation of new software for selecting testing days and personnel that is designed to ensure greater randomization of the testing process.
- Personnel who did not report drug use in the past 12 months were more likely to rate that it was very hard to predict testing (64.1%) than those who did report drug use (45.7%).

5.7 Military and Civilian Comparisons

In this section, we examine past 30-day drug use among military personnel and civilians, with the civilian data drawn from the 1997 National Household Survey on Drug Abuse (NHSDA). Compared to the general population, the Military contains a disproportionately large percentage of young males, a group that typically has high rates of drug use. For comparisons between drug use in military and civilian populations to be valid, consideration must be given to differences in sociodemographic characteristics between military personnel and civilians. To address this, we standardized the NHSDA data for civilians to the distribution of U.S.-based military personnel by gender, age, education, race/ethnicity, and marital status. Prevalence estimates for the DoD and the individual Services are actual estimates for U.S.-based personnel, including those stationed in Alaska and Hawaii.

As shown in Table 22, military personnel were significantly less likely than civilians to use any illicit drug in the past 30 days (2.6% vs. 10.7%). This pattern held across all age groups and for males and females for the total DoD. Each of the Services showed the same

Table 20. Any Illicit Drug Use in Past 12 Months, by Last Time Tested for Illicit Drug Use

Service/Testing	Illicit Drug Use, Past 12 Months		Total
	Yes	No	
Army			
Tested in past 30 days	34.2 (3.2)	31.8 (2.1)	32.0 (2.1)
Tested more than 30 days ago, but within past 12 months	57.8 (3.3)	62.0 (1.8)	61.5 (1.7)
More than 12 months ago	5.9 (1.4)	5.7 (0.7)	5.7 (0.6)
Never	2.0 (0.8)	0.6 (0.2)	0.7 (0.2)
Navy			
Tested in past 30 days	19.9 (4.0)	25.5 (1.7)	25.2 (1.7)
Tested more than 30 days ago, but within past 12 months	69.9 (4.9)	64.3 (1.1)	64.5 (1.2)
More than 12 months ago	10.2 (3.1)	9.5 (1.1)	9.5 (1.0)
Never	** (**)	0.7 (0.2)	0.7 (0.2)
Marine Corps			
Tested in past 30 days	41.8 (4.7)	32.9 (2.7)	33.5 (2.8)
Tested more than 30 days ago, but within past 12 months	51.8 (4.1)	61.0 (2.0)	60.4 (2.1)
More than 12 months ago	5.3 (2.3)	5.8 (1.2)	5.7 (1.2)
Never	1.1 (0.8)	0.3 (0.1)	0.4 (0.1)
Air Force			
Tested in past 30 days	19.3 (1.8)	12.9 (0.8)	13.0 (0.8)
Tested more than 30 days ago, but within past 12 months	61.4 (4.0)	61.9 (1.2)	61.8 (1.1)
More than 12 months ago	13.1 (3.8)	22.9 (1.5)	22.6 (1.4)
Never	6.2 (3.5)	2.4 (0.3)	2.5 (0.3)
Total DoD			
Tested in past 30 days	31.1 (2.0)	24.8 (0.9)	25.1 (0.9)
Tested more than 30 days ago, but within past 12 months	59.5 (2.2)	62.4 (0.8)	62.3 (0.8)
More than 12 months ago	7.4 (1.2)	11.7 (0.6)	11.4 (0.6)
Never	2.0 (0.6)	1.1 (0.1)	1.2 (0.1)

Note: Table entries are column percentages (with standard errors in parentheses). Estimates have not been adjusted for sociodemographic differences among Services. Definitions and measures of substance use are given in Section 2.2.

** Estimate round to zero.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Any Illicit Drug Use, Q60-61 and 67; Last Time Tested, Q63).

Table 21. Any Illicit Drug Use in Past 12 Months, by Predictability of Drug Testing

Service/Predictability	Illicit Drug Use, Past 12 Months		Total
	Yes	No	
Army			
Very easy	19.1 (2.2)	13.4 (0.8)	13.9 (0.8)
Somewhat easy	18.9 (1.9)	13.4 (1.0)	13.9 (0.9)
Somewhat hard	22.2 (2.1)	22.5 (0.7)	22.4 (0.7)
Very hard	39.9 (4.2)	50.1 (1.7)	49.1 (1.7)
Never tested	** (**)	0.7 (0.3)	0.6 (0.2)
Navy			
Very easy	15.4 (2.5)	7.8 (0.6)	8.1 (0.6)
Somewhat easy	9.6 (2.5)	5.3 (0.5)	5.5 (0.4)
Somewhat hard	9.9 (2.3)	11.1 (0.7)	11.0 (0.7)
Very hard	65.1 (2.9)	75.1 (0.9)	74.7 (1.0)
Never tested	** (**)	0.7 (0.2)	0.7 (0.2)
Marine Corps			
Very easy	23.8 (4.2)	16.9 (0.8)	17.4 (0.8)
Somewhat easy	22.4 (2.9)	14.2 (1.2)	14.8 (1.2)
Somewhat hard	15.9 (2.4)	20.7 (0.7)	20.3 (0.6)
Very hard	36.2 (3.9)	47.8 (1.6)	47.0 (1.8)
Never tested	1.6 (1.2)	0.5 (0.2)	0.5 (0.2)
Air Force			
Very easy	15.1 (3.2)	6.7 (0.6)	6.9 (0.6)
Somewhat easy	11.4 (4.9)	5.3 (0.3)	5.5 (0.4)
Somewhat hard	10.9 (4.1)	8.8 (0.6)	8.8 (0.6)
Very hard	56.3 (5.0)	76.6 (1.0)	76.1 (0.9)
Never tested	6.3 (3.5)	2.6 (0.3)	2.7 (0.3)
Total DoD			
Very easy	18.7 (1.5)	10.4 (0.4)	10.9 (0.4)
Somewhat easy	16.9 (1.4)	9.0 (0.4)	9.5 (0.4)
Somewhat hard	17.8 (1.4)	15.3 (0.4)	15.4 (0.4)
Very hard	45.7 (2.7)	64.1 (0.8)	63.0 (0.8)
Never tested	1.0 (0.5)	1.2 (0.1)	1.2 (0.1)

Note: Table entries are column percentages (with standard errors in parentheses). Estimates have not been adjusted for sociodemographic differences among Services. Definitions and measures of substance use are given in Section 2.2.

**Estimates round to zero.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Any Illicit Drug Use, Q60-61 and 67; Predictability of Drug Testing, Q64).

Table 22. Standardized Comparisons of the Prevalence of Any Illicit Drug Use, Past 30 Days, Among Military Personnel and Civilians, for Persons Aged 18 to 55

Gender/ Age Group	Civilian	Comparison Population				
		Total DoD	Army	Navy	Marine Corps	Air Force
Males						
18-25	N=6,177 17.1 (1.3)	N=9,338 5.7 (0.9) ^a	N=2,647 8.6 (1.9) ^a	N=1,916 2.1 (0.7) ^a	N=2,436 4.9 (0.7) ^a	N=2,339 3.5 (0.8) ^a
26-55	7.9 (0.8)	1.1 (0.2) ^a	2.3 (0.4) ^a	0.8 (0.3) ^a	0.5 (0.2) ^a	0.5 (0.2) ^a
All ages	11.4 (0.8)	2.8 (0.4) ^a	5.0 (1.0) ^a	1.1 (0.2) ^a	3.1 (0.5) ^a	1.3 (0.2) ^a
Females						
18-25	N=8,496 9.4 (0.9)	N=3,214 2.5 (0.4) ^a	N=947 3.8 (0.7) ^a	N=922 4.1 (1.2) ^a	N=505 3.2 (1.2) ^a	N=840 ** (**)
26-55	3.7 (0.5)	1.4 (0.4) ^a	1.9 (0.7) ^a	2.3 (1.0)	0.4 (0.4) ^a	0.6 (0.3) ^a
All ages	6.2 (0.5)	1.9 (0.2) ^a	2.8 (0.3) ^a	3.0 (0.5) ^a	2.1 (0.8) ^a	0.4 (0.2) ^a
Total						
18-25	N=14,673 15.9 (1.1)	N=12,552 5.2 (0.8) ^a	N=3,594 7.9 (1.7) ^a	N=2,838 2.5 (0.6) ^a	N=2,941 4.8 (0.7) ^a	N=3,179 2.7 (0.6) ^a
26-55	7.4 (0.7)	1.2 (0.2) ^a	2.2 (0.4) ^a	1.0 (0.3) ^a	0.5 (0.2) ^a	0.5 (0.2) ^a
All ages	10.7 (0.7)	2.6 (0.3) ^a	4.7 (0.9) ^a	1.4 (0.2) ^a	3.0 (0.5) ^a	1.2 (0.2) ^a

Note: Table entries are percentages (with standard errors in parentheses). Definitions and measures of substance use are given in Section 2.2. Civilian data have been standardized to the U.S.-based military data by gender, age, education, race/ethnicity, and marital status. Data for the total DoD and the individual Services are U.S.-based population estimates (including personnel in Alaska and Hawaii). N's show the number of cases on which the weighted estimates are based. Estimates have not been adjusted for sociodemographic differences among Services.

**Estimates round to zero.

^aSignificantly different from civilian estimate at the .05 significance level.

Civilian data source: National Household Survey on Drug Abuse, 1997.

Military data source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Any Illicit Drug Use, Past 30 Days, Q60 and 61).

patterns as for the total DoD across the age and gender groups with one exception; there were no significant differences for Navy women aged 26 to 55 compared to civilian women in that age group.

Differences between the military and civilian populations were more pronounced for males than for females, particularly with younger males. We estimated that 2.8% of U.S.-based males in the Military aged 18 to 55 used drugs in the past 30 days compared to 11.4% of civilian males. For females, 1.9% of those aged 18 to 55 in the Military used drugs in the past month compared to 6.2% of civilians.

5.8 Summary

Illicit drug use declined steadily and dramatically in the Military from 1980 to 1998. Rates of drug use among military personnel in 1998 were the lowest since the survey series began and were not explained by changes in the demographic composition of the Military. Rates of use were significantly lower in the Military than among civilians. Military personnel who had reported drug use in the past 12 months reported more occurrences of productivity loss at work than those who did not use drugs. Nearly all military personnel had been tested for drugs since joining the Military. The large majority of personnel reported that it had been difficult to predict when they were last going to be tested. Those who used drugs in the past year were less likely than nonusers to report that it was very hard to predict they were going to be tested. Those with the greatest odds of using drugs were younger (and typically of lower pay grades), unmarried males with a high school education, and in the Army and Marine Corps. Prevention programs may be most effective by targeting these groups.

6. TOBACCO USE

This chapter describes tobacco use (cigarettes, smokeless tobacco, and cigars and pipes) among military personnel. Although cigarette use among military personnel has declined sharply since this DoD series of surveys began in 1980, tobacco use, in cigarette and other forms, remained common in the Military in 1998. We present a brief overview of the trends in cigarette use in the Military in Chapter 3. In this chapter, we present information regarding prevalence and trends in cigarette use among the Services, sociodemographic correlates of smoking, attempts at smoking cessation, and comparisons between military and civilian populations. We also present information on other forms of tobacco use, including the prevalence of smokeless tobacco and cigars or pipes. Finally, given a notable increase in cigar/pipe smoking, comparisons in this behavior between 1995 and 1998 are presented.

6.1 Trends in Cigarette Use

Prior studies among civilians and military personnel have shown a decline in the prevalence of cigarette smoking over the past two decades (e.g., CDC, 1997a; Bray et al., 1995). This trend was supported by findings of the 1998 DoD survey, which show smoking levels at their lowest since the survey series began in 1980 (see Table 23). The rate of decline slowed recently, however, and the differences in smoking rates from 1995 to 1998 were not significant.

- The prevalence of any cigarette smoking for the total DoD declined from 51.0% in 1980 to 29.9% in 1998. For all four Services, the prevalences of any cigarette smoking in 1998 were significantly lower relative to the start of the survey series in 1980.
- The prevalence of heavy cigarette smoking (one or more packs per day) for the total DoD also showed a significant decline from 34.2% in 1980 to 13.4% in 1998. We observed similar overall trends in the decline in heavy smoking relative to 1980 for all four Services.
- The rates of any smoking in the total DoD and in all four Services were all still well above the 20% target set for military personnel by *Healthy People 2000*.

6.2 Service Comparisons of Cigarette Use

To examine the potential impact of sociodemographic differences among the Services, we developed adjusted prevalence estimates by standardizing the sociodemographic compositions of the Services to the gender, age, education, race/ethnicity, and marital status distributions for the total DoD. These data are presented in Table 24.

Table 23. Trends in Cigarette Use, Past 30 Days, by Service, 1980-1998

Service/ Smoking Level	Year of Survey						
	1980	1982	1985	1988	1992	1995	1998
Army							
Any smoking	54.3 (0.7)	54.7 (1.8)	52.0 (1.8)	43.1 (1.1) ^a	37.0 (2.0) ^a	34.1 (1.6)	31.1 (1.2) ^b
Heavy smoking	35.2 (0.7)	34.6 (1.4)	33.6 (1.4)	22.8 (0.7) ^a	18.0 (1.1) ^a	17.0 (0.6)	14.1 (0.8) ^{a,b}
Navy							
Any smoking	53.8 (1.2)	55.4 (1.0)	47.9 (1.2) ^a	43.8 (1.8)	37.1 (1.7) ^a	34.9 (1.6)	30.6 (1.5) ^b
Heavy smoking	37.3 (1.3)	35.7 (1.4)	34.8 (1.6)	24.6 (2.0) ^a	20.4 (0.5) ^a	16.3 (1.4) ^a	14.8 (1.1) ^b
Marine Corps							
Any smoking	53.4 (0.6)	48.7 (0.4) ^a	42.6 (3.1)	41.3 (1.8)	39.2 (2.3)	35.0 (1.8)	34.9 (2.1) ^b
Heavy smoking	34.5 (0.9)	31.6 (0.7) ^a	26.1 (0.8) ^a	18.7 (2.2) ^a	20.7 (1.8)	15.0 (1.2) ^a	13.5 (1.1) ^b
Air Force							
Any smoking	43.2 (1.8)	44.1 (1.6)	39.0 (2.3)	35.8 (1.2)	29.2 (1.4) ^a	25.1 (1.3) ^a	25.7 (1.5) ^b
Heavy smoking	29.7 (1.3)	30.6 (1.2)	26.8 (1.7)	22.0 (0.8) ^a	14.6 (1.0) ^a	11.2 (0.8) ^a	11.2 (1.0) ^b
Total DoD							
Any smoking	51.0 (0.8)	51.4 (0.8)	46.2 (1.0) ^a	40.9 (0.8) ^a	35.0 (1.0) ^a	31.9 (0.9) ^a	29.9 (0.8) ^b
Heavy smoking	34.2 (0.6)	33.5 (0.7)	31.2 (0.8) ^a	22.7 (0.7) ^a	18.0 (0.5) ^a	15.0 (0.6) ^a	13.4 (0.5) ^b

Note: Table entries are percentages (with standard errors in parentheses). Estimates have not been adjusted for sociodemographic differences among Services. Definitions and measures of substance use are given in Section 2.2.

^aComparisons between this survey and the preceding survey are statistically significant at the 95% confidence level.

^bComparisons between 1980 and 1998 are statistically significant at the 95% confidence level.

Source: DoD Surveys of Health Related Behaviors Among Military Personnel, 1980 to 1998 (1998 Questions: Any Smoking, Q44 and 47, Heavy Smoking, Q45).

Table 24. Estimates of Cigarette Use, Unadjusted and Adjusted for Sociodemographic Differences, by Service

Smoking Measure	Service				Total DoD
	Army	Navy	Marine Corps	Air Force	
Any Smoking					
Unadjusted	31.1 (1.2) ^a	30.6 (1.5) ^a	34.9 (2.1) ^a	25.7 (1.5)	29.9 (0.8)
Adjusted ^b	31.8 (0.8) ^a	29.8 (1.5)	28.9 (1.4)	27.4 (1.4)	29.9 (0.8)
Heavy Smoking					
Unadjusted	14.1 (0.8) ^a	14.8 (1.1) ^a	13.5 (1.1)	11.2 (1.0)	13.4 (0.5)
Adjusted ^b	15.4 (0.6) ^{a,c}	14.0 (1.0)	11.9 (0.9)	11.9 (0.8)	13.4 (0.5)

Note: Table entries are percentages (with standard errors in parentheses). Pairwise significance tests were done between all possible Service combinations (e.g., Army vs. Navy, Navy vs. Marine Corps). Definitions and measures of substance use are given in Section 2.2.

^aEstimate is significantly different from the Air Force at the 95% confidence level.

^bAdjusted estimates have been standardized by gender, age, education, race/ethnicity, and marital status to the total DoD.

^cEstimate is significantly different from the Marine Corps at the 95% confidence level.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Any Smoking, Q44 and 47; Heavy Smoking, Q45).

- For any cigarette smoking, adjusting for sociodemographic differences resulted in slightly lower estimates for the Navy (29.8% adjusted vs. 30.6% unadjusted) and Marine Corps (28.9% vs. 34.9%), and slightly higher estimates for the Army (31.8% vs. 31.1%) and Air Force (27.4% vs. 25.7%).
- The same pattern applied for heavy smoking; adjusted prevalence estimates were somewhat lower for the Navy (14.0% adjusted vs. 14.8% unadjusted) and Marine Corps (11.9% vs. 13.5%), and slightly higher for the Army (15.4% vs. 14.1%) and Air Force (11.9% vs. 11.2%).

Adjusting the prevalence estimates for sociodemographic differences among the Services changed the pattern of significant differences. Unadjusted means for any smoking indicated that the Air Force had a lower rate than any of the other three Services, but when the means were adjusted, only the Army showed a higher rate than the Air Force. For heavy smoking, the unadjusted means showed that both the Army and the Navy had higher rates than the Air Force; whereas when the means were adjusted, this difference was significant only for the Army.

These findings suggest that the rates of any smoking and heavy smoking for the individual Services would be somewhat different if they had the same sociodemographic

composition, and that differences in the gender, age, education, race/ethnicity, and/or marital status distributions across the Services play a small role in explaining the differences in smoking prevalence. Once sociodemographic differences among the Services are controlled by adjusting the estimates, Army personnel stand out as the most likely to report any smoking and heavy smoking. These differences in smoking rates might be explained in part by environmental or programmatic differences between the Army and the other Services. Alternatively, there may be other differences in the characteristics of personnel who join the Army compared to those who join the other Services. For example, individuals who join the Army may be more predisposed to become smokers or less predisposed to quit, or they may have fewer negative attitudes and values about smoking.

6.3 Correlates of Cigarette Use

Development of sound policies and programs regarding smoking requires knowledge of the characteristics of tobacco users. We compared the prevalence estimates of current smoking across various demographic groups and tested for the simultaneous effects of these demographic characteristics in a multivariate logistic regression model (Table 25). We focus on the results of the logistic regression model.

The logistic regression analyses estimated the odds of being a current smoker. Demographic variables were independent (i.e., predictor) variables in the model. Reference groups, or those to whom all other categories of each demographic variables were compared, are designated by a 1.00 in the adjusted odds ratios column in Table 25. Odds ratios greater than 1.00 indicate a greater likelihood of smoking in the comparison group relative to the reference group, and those less than 1.00 indicate a lesser likelihood. Confidence intervals of 95% indicate whether the odds ratio is significantly significant at the .05 level (i.e., there is a significant difference between the reference group and the comparison group). Nearly all of the adjusted odds ratios presented in Table 25 were significant (note that significant differences are indicated by superscript c).

- Males were significantly more likely than females to be current smokers (30.6% vs. 25.5%).
- Non-Hispanic Caucasians (33.0%) were significantly more likely than personnel in any other racial/ethnic groups to smoke (non-Hispanic African Americans, 19.5%; Hispanics, 27.9%; others, 30.6%).
- Cigarette smoking was significantly and negatively related to education, with 40.7% of personnel with a high school education being smokers compared to only 11.2% of personnel with a college degree or higher.
- Pay grade was negatively and strongly related to current smoking. The odds of personnel in pay grades E1 to E3 smoking were over 6 times those of personnel in pay grades O4 to O10 (42.7% vs. 6.6%).

Table 25. Demographic Correlates of Any Cigarette Smoking, Past 30 Days, Total DoD

Sociodemographic Characteristic	Prevalence	Adjusted Odds Ratio ^a	95% CI of Odds Ratio ^b
Service			
Army	31.1 (1.2)	1.40 ^c	(1.24, 1.58)
Navy	30.6 (1.5)	1.18 ^c	(1.01, 1.39)
Marine Corps	34.9 (2.1)	1.20 ^c	(1.03, 1.40)
Air Force	25.7 (1.5)	1.00	NA
Gender			
Male	30.6 (0.8)	1.17 ^c	(1.04, 1.30)
Female	25.5 (1.0)	1.00	NA
Race/Ethnicity			
Caucasian, non-Hispanic	33.0 (1.0)	1.00	NA
African American, non-Hispanic	19.5 (1.1)	0.37 ^c	(0.31, 0.43)
Hispanic	27.9 (1.4)	0.59 ^c	(0.50, 0.70)
Other	30.6 (1.5)	0.80 ^c	(0.70, 0.91)
Education			
High school or less	40.7 (0.8)	2.35 ^c	(1.91, 2.91)
Some college	31.7 (0.8)	1.77 ^c	(1.43, 2.19)
College graduate or higher	11.2 (0.7)	1.00	NA
Age			
20 or younger	39.8 (1.7)	0.71 ^c	(0.55, 0.90)
21-25	37.6 (1.1)	0.91	(0.76, 1.09)
26-34	26.3 (1.0)	0.84 ^c	(0.72, 0.99)
35 or older	22.8 (0.8)	1.00	NA
Family Status^d			
Not married	35.9 (0.9)	1.30 ^c	(1.17, 1.44)
Married, spouse not present	30.1 (1.6)	1.15	(0.98, 1.35)
Married, spouse present	25.5 (0.9)	1.00	NA
Pay Grade			
E1-E3	42.7 (1.0)	6.39 ^c	(4.60, 8.88)
E4-E6	33.1 (0.9)	4.64 ^c	(3.33, 6.45)
E7-E9	26.9 (1.0)	3.68 ^c	(2.73, 4.94)
W1-W5	21.0 (2.0)	2.54 ^c	(1.71, 3.77)
O1-O3	9.0 (0.8)	1.49 ^c	(1.11, 1.99)
O4-O10	6.6 (0.7)	1.00	NA
Region			
CONUS ^e	29.5 (0.9)	0.95	(0.85, 1.06)
OCONUS ^f	31.2 (1.3)	1.00	NA
Total	29.9 (0.8)	NA	NA

Note: Prevalence estimates are percentages (with standard errors in parentheses). Definitions and measures of substance use are given in Section 2.2.

NA = Not applicable.

^aOdds ratios were adjusted for Service, gender, race/ethnicity, education, age, family status, pay grade, and region.

^b95% CI = 95% confidence interval of the odds ratio.

^cEstimate is significantly different from the reference group at the 95% confidence level.

^dEstimates by family status in 1998 are not strictly comparable to those from other survey years. In 1998, personnel who reported that they were living as married were classified in the "not married" group. In prior years, the marital status question did not distinguish between personnel who were married and those who were living as married.

^eRefers to personnel stationed within the 48 contiguous States in the continental United States.

^fRefers to personnel stationed outside the continental United States or aboard afloat ships.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Any Cigarette Smoking, Past 30 Days, Q44 and 47; refer to Section 2.2 for descriptions of sociodemographic variables).

- Prevalence estimates indicated that age was negatively associated with smoking. Interestingly, odds ratios in the logistic regression model showed a different pattern. Apparently, once factors related to age, such as education, family status, and pay grade, were controlled for statistically, older personnel were generally more likely to smoke than younger personnel. This effect likely is due to the strong relationship between age and pay grade.
- Unmarried personnel were significantly more likely than married personnel living with their spouses to be current smokers (35.9% vs. 25.5%).

6.4 Attempts to Stop Smoking Cigarettes

Information about attempts to quit smoking provides useful insights about needs for additional program emphasis and groups likely to be receptive to "quit smoking" messages. Table 26 presents the findings on attempts to stop smoking cigarettes among military personnel.

- In the total DoD, 14.1% of all personnel successfully stopped smoking, with 3.8% having quit in the past year. An additional 15.6% made a serious, but unsuccessful, attempt to quit smoking in the past year. Overall, more than 56% of military personnel never smoked.
- Among those who smoked during the past year, 46.6% made an attempt to quit smoking. Only 11.3%, however, of the personnel who were smokers in the past year successfully quit.

6.5 Military and Civilian Comparisons of Cigarette Use

In a previous comparison of smoking rates in the military and civilian populations, we found that the prevalence rates of any smoking in 1995 were significantly higher among military personnel aged 18 to 24 years than they were among civilians in the same age group, after the civilian data had been standardized to take into account demographic differences (Bray et al., 1995). Using the 1998 DoD survey data and 1997 NHSDA data, we compared rates of *current* smoking among the military and civilian populations after we adjusted the civilian data to reflect the demographic characteristics of the military population (Table 27).

- Overall, military personnel showed a significantly lower rate of any smoking (29.1%) than the civilian population (32.8%). Although this difference was statistically significant, it was not large. It appears that the driving force behind this difference was that in the total DoD, younger male military personnel (aged 18 to 25) showed lower rates of current smoking (39.1%) than did civilians in the same age and gender group (45.0%). Comparisons of rates for older age groups, however, were not significantly different.

Table 26. Smoking Status and Smoking Cessation, Past 12 Months, by Service

Group/Status	Service				Total DoD
	Army	Navy	Marine Corps	Air Force	
Among All Personnel					
Never smoked ^a	56.8 (0.8)	52.6 (1.4)	54.2 (1.5)	59.6 (2.0)	56.2 (0.7)
Former smoker, quit over a year ago	8.9 (0.6)	12.7 (0.8)	7.2 (0.8)	11.3 (0.6)	10.3 (0.4)
Former smoker, quit within past year	3.3 (0.4)	4.5 (0.5)	4.1 (0.3)	3.6 (0.3)	3.8 (0.2)
Current smoker, tried to quit	16.2 (0.7)	14.7 (1.0)	19.2 (1.3)	14.0 (1.0)	15.6 (0.5)
Current smoker, didn't try to quit	14.8 (0.7)	15.5 (1.0)	15.3 (1.2)	11.4 (0.7)	14.1 (0.4)
Among Smokers, Past Year					
Former smoker, quit within past year	9.5 (1.3)	12.9 (1.3)	10.5 (0.9)	12.5 (0.7)	11.3 (0.6)
Current smoker, tried to quit	47.2 (1.1)	42.4 (2.0)	49.8 (1.9)	48.2 (1.3)	46.6 (0.8)
Current smoker, didn't try to quit	43.2 (1.4)	44.7 (1.8)	39.7 (2.0)	39.2 (1.2)	42.2 (0.8)
Among Current Smokers					
Planning to quit in next 30 days	31.8 (1.5)	34.8 (1.5)	35.8 (1.4)	33.4 (1.5)	33.5 (0.8)
Intending to quit in next 6 months	24.3 (1.4)	24.6 (1.3)	22.7 (1.4)	22.7 (1.3)	23.8 (0.7)

Note: Table entries are column percentages (with standard errors in parentheses). Estimates have not been adjusted for sociodemographic differences among Services. Definitions and measures of substance use are given in Section 2.2. Current smokers are defined as those who smoked at least 100 cigarettes and smoked in the past 30 days.

^aSmoked fewer than 100 cigarettes in the lifetime (Q44 and 47).

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Former Smoker, Quit Over a Year Ago or Within Past Year, Q44 and 47; Current Smoker, Tried to Quit or Didn't Try to Quit, Q44, 47-48; Current Smoker, Planning to Quit in Next 30 Days, Q44, 47 and 50; Current Smoker, Planning to Quit in Next 6 Months, Q44, 47, and 49).

Table 27. Standardized Comparisons of the Prevalence of Any Cigarette Smoking Among Military Personnel and Civilians, Past 30 Days, for Persons Aged 18 to 55

Gender/ Age Group	Comparison Population					
	Civilian	Total DoD	Army	Navy	Marine Corps	Air Force
Males	N=6,114	N=9,338	N=2,647	N=1,916	N=2,436	N=2,339
18-25	45.0 (1.7)	39.1 (1.2) ^a	40.2 (1.8)	32.3 (3.2) ^a	44.3 (1.7)	37.1 (2.4) ^a
26-55	27.0 (1.3)	24.3 (0.9)	25.0 (1.2)	28.3 (2.0)	21.6 (1.8)	20.7 (1.7) ^a
All ages	33.8 (1.0)	29.7 (0.9) ^a	31.6 (1.3)	29.3 (1.8) ^a	34.6 (2.4)	25.2 (1.9) ^a
Females	N=8,396	N=3,214	N=947	N=922	N=505	N=840
18-25	28.4 (1.5)	27.8 (1.3)	21.9 (1.7) ^a	31.1 (3.2)	32.9 (3.7) ^a	30.9 (2.6)
26-55	25.1 (1.2)	23.5 (1.5)	19.3 (2.1) ^a	26.0 (3.0)	26.1 (3.5) ^a	25.4 (2.9)
All ages	26.6 (1.0)	25.4 (1.2)	20.5 (1.1) ^a	28.0 (2.7)	30.3 (3.2) ^a	27.7 (2.4)
Total	N=14,510	N=12,552	N=3,594	N=2,838	N=2,941	N=3,179
18-25	42.4 (1.5)	37.3 (1.1) ^a	37.5 (1.6) ^a	32.1 (2.6) ^a	43.5 (1.7)	35.6 (2.4) ^a
26-55	26.7 (1.1)	24.2 (0.9)	24.2 (1.2)	28.1 (2.0)	21.8 (1.8) ^a	21.4 (1.7) ^a
All ages	32.8 (1.0)	29.1 (0.9) ^a	30.0 (1.3)	29.1 (1.8)	34.4 (2.3)	25.7 (1.9) ^a

Note: Table entries are percentages (with standard errors in parentheses). Definitions and measures of substance use are given in Section 2.2. Civilian data have been standardized to the U.S.-based military data by gender, age, education, race/ethnicity, and marital status. Data for the total DoD and the individual Services are U.S.-based population estimates (including personnel in Alaska and Hawaii). N's show the number of cases on which the weighted estimates are based. Estimates have not been adjusted for sociodemographic differences among Services.

^aSignificantly different from civilian at the .05 significance level.

Civilian data source: National Household Survey on Drug Abuse, 1997.

Military data source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Any Cigarette Smoking, Past 30 Days, Q44 and 47).

- When Services were examined individually (with gender and age breakdowns), each exhibited a different pattern of significant difference from the civilian population. When all members of a Service were considered together, only the Air Force had a lower rate of smoking than civilians.

The most interesting finding was that, in 1998, rates of cigarette smoking in the Military were equal to or lower than rates of smoking in the corresponding civilian population. This finding represents the first time in the DoD series of surveys that certain age and gender groups of military personnel smoked less than their civilian counterparts. Although it appears that this change may be due more to rising smoking rates among young people in the civilian population than to falling rates among military personnel, it is encouraging that members of the Armed Forces are not following the societal trend toward higher smoking rates.

6.6 Cigar, Pipe, and Smokeless Tobacco Use

The 1998 DoD survey confirmed that although cigarette smoking was still the most pervasive form of tobacco use in the Military, other forms of tobacco also were used. Planners and policymakers must be aware of the prevalence of all types of tobacco use in order to develop comprehensive policies and programs for tobacco use prevention and cessation. Our findings reveal that considerable effort is needed to achieve the *Healthy People 2000* objective of 4% current smokeless tobacco use among males aged 24 or younger and that there has been a strong resurgence in cigar or pipe smoking.

- As shown in Table 28, 11.7% of military personnel had used smokeless tobacco in the 30 days prior to the survey, and approximately one-fifth had used it in the past year. Past month use was highest among men aged 18 to 24 (19.0%). The only Service to show a significant drop from 1995 to 1998 in the use of smokeless tobacco was the Marine Corps (although it still had the highest rate of smokeless tobacco use). This decline in the Marine Corps was driven by a reduction among 18- to 24-year-old males from 30.6% in 1995 to 22.4% in 1998.
- An estimated 32.6% of military personnel smoked cigars or a pipe in the 12 months prior to the survey. This figure is 13.9 percentage points higher than the 1995 rate (see Table 29). Cigar or pipe smoking rates rose at least 11 percentage points for each Service. Although the vast majority of cigar or pipe smoking occurred infrequently (less than once a week), this drastic increase should be of concern to the DoD, and the use of cigars and pipes should be closely monitored in future surveys.

Smokeless tobacco use in the Military, and particularly among young males, is also cause for concern. The use of smokeless tobacco in the past 30 days for each Service ranged from about 9% to about 19%. It was especially prevalent among men aged 24 or younger (19%). Given that one of the *Healthy People 2000* objectives is to reduce the

Table 28. Comparison of Smokeless Tobacco Use in 1995 and 1998, Past 30 Days, for All Personnel and for Males

Service/Age Group	Year	
	1995	1998
Army		
All personnel	15.3 (1.1)	14.4 (1.3)
Males		
All ages	17.4 (1.1)	16.7 (1.3)
Ages 18-24	21.5 (1.4)	20.1 (1.2)
Ages 25-34	18.6 (1.5)	18.6 (1.8)
Ages 35+	7.3 (1.0)	8.3 (1.0)
Navy		
All personnel	12.0 (1.7)	9.2 (0.8)
Males		
All ages	13.4 (1.7)	10.4 (0.7)
Ages 18-24	21.2 (2.7)	18.1 (1.7)
Ages 25-34	12.2 (1.5)	11.7 (0.8)
Ages 35+	4.6 (0.9)	3.2 (0.6)
Marine Corps		
All personnel	24.0 (1.4)	19.1 (1.6) ^a
Males		
All ages	25.1 (1.3)	20.3 (1.5) ^a
Ages 18-24	30.6 (1.0)	22.4 (2.0) ^a
Ages 25-34	21.2 (2.2)	21.9 (1.3)
Ages 35+	11.6 (1.4)	10.2 (1.2)
Air Force		
All personnel	7.9 (1.0)	7.3 (0.7)
Males		
All ages	9.3 (1.1)	8.9 (0.8)
Ages 18-24	15.9 (1.6)	13.7 (1.0)
Ages 25-34	9.0 (1.1)	10.5 (0.9)
Ages 35+	3.3 (0.9)	3.4 (1.0)
Total DoD		
All personnel	13.2 (0.7)	11.7 (0.7)
Males		
All ages	15.0 (0.7)	13.4 (0.6)
Ages 18-24	21.9 (1.0)	19.0 (0.8) ^a
Ages 25-34	13.9 (0.7)	14.6 (0.7)
Ages 35+	5.5 (0.5)	5.3 (0.5)

Note: Table entries are percentages (with standard errors in parentheses) of personnel who used smokeless tobacco at least 20 times in the lifetime and who used it in the past 30 days. Estimates have not been adjusted for sociodemographic differences among Services. Definitions and measures of substance use are given in Section 2.2.

^aComparisons between 1995 and 1998 are statistically significant at the 95% confidence level.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1995 and 1998 (1998 Questions: Smokeless Tobacco Use, Q51 and 55; refer to Section 2.5.1 for descriptions of sociodemographic variables).

Table 29. Service Comparisons in the Prevalence of Any Cigar or Pipe Use, Past 12 Months, 1995 and 1998

Service	Year	
	1995	1998
Army	22.1 (1.5)	33.1 (1.6) ^a
Navy	17.1 (1.5)	31.3 (1.6) ^a
Marine Corps	28.4 (1.3)	42.0 (1.2) ^a
Air Force	12.8 (0.7)	28.9 (1.3) ^a
Total DoD	18.7 (0.7)	32.6 (0.8) ^a

Note: Table entries are percentages (with standard errors in parentheses). Estimates have not been adjusted for sociodemographic differences among Services. Definitions and measures of substance use are given in Section 2.2.

^a1998 estimate is significantly different from 1995 estimate at the .05 significance level.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Cigar/Pipe Use, Q57).

current prevalence of smokeless tobacco use to no more than 4% of males aged 24 or younger, these findings indicate that the DoD and the Services will have to engage in considerable effort to reduce smokeless tobacco use among young males if this objective is to be met within the Military.

In addition, the sharp increase in cigar or pipe smoking in the Military should be seriously considered by the DoD. Given the dramatically quick rise in use over a 3-year period, both intense short-term steps and longer-term monitoring should be addressed.

6.7 Summary

Taken together, findings from the 1998 DoD survey indicate that the Military has made considerable progress since 1980 in reducing the prevalence of cigarette smoking among its personnel. Overall, military rates of smoking were statistically lower than civilian rates, although this finding should be regarded with cautious optimism in that the difference was small in magnitude and seems largely to have been caused by an increase in smoking among civilians rather than significant decreases among military personnel. The rates of any cigarette smoking in the total DoD (29.1%) and in all four Services (25.7% to 34.9%) were all still well above the *Healthy People 2000* target of 20% for the Military.

Rates of smokeless tobacco use also exceed *Healthy People 2000* goals, and prevalence was especially high among young males. Finally, the rate of cigar or pipe smoking increased sharply from 1995 to 1998 for each Service and for the total DoD. This trend should be addressed and monitored by the DoD.

7. HEALTH BEHAVIOR AND HEALTH PROMOTION

In this chapter, we report indicators of health behavior and health promotion among military personnel. Specifically, we examine fitness and cardiovascular disease risk reduction, injuries and injury prevention, and sexually transmitted disease (STD) risk reduction. Where appropriate, knowledge and behavior among military personnel are compared with relevant *Healthy People 2000* objectives (PHS, 1991). In contrast to DoD-level information presented in Chapter 3, this chapter examines estimates for the Services and includes more detailed information about attainment of *Healthy People 2000* objectives.

7.1 Fitness and Cardiovascular Disease Risk Reduction

Cardiovascular disease, including coronary heart disease and stroke, remains a prevalent public health problem. Research has shown high blood pressure to be a risk factor for coronary heart disease and stroke and high blood cholesterol to also be related to coronary heart disease (Kannel, 1993; National Cholesterol Education Program, 1994). Regular physical activity can reduce the risks of coronary heart disease, can prevent or help control high blood pressure, and is important for weight control (DHHS, 1996; Paffenbarger, Hyde, Wing, & Hsieh, 1986; Piani & Schoenborn, 1993; Siscovick, LaPorte, & Newman, 1985). Overall physical well-being also can be compromised by being underweight. Among young men (17 or younger), being underweight has been linked with bronchial and lung conditions, intestinal conditions, and emotional disorders (Lusky et al., 1996).

7.1.1 Overweight, Underweight, and Exercise

Guidelines for the evaluation of overweight and underweight have changed over time. Recently, new criteria for determining overweight and underweight were released by the National Heart, Lung, and Blood Institute (NHLBI, 1998). Thus, prevalence rates of overweight and underweight are presented using previous guidelines and those recently suggested by the NHLBI. Although these new NHLBI guidelines have not been adopted by the Military, we have included them in our analyses in order to present the data using the most current recommendations for overweight and underweight and to provide information for the Military to assess the impact of the new guidelines.

7.1.1.1 Overweight. Table 30 presents the prevalence of overweight based on *Healthy People 2000* criteria:

- Among DoD personnel under age 20, 22.9% were overweight according to their Body Mass Index (BMI). This exceeds the *Healthy People 2000* objective of having a prevalence of no more than 15%

Table 30. Prevalence of Overweight Active-Duty Personnel, by Age and Gender

Gender/Age Group	Service								Total DoD	
	Army		Navy		Marine Corps		Air Force			
Males ^a										
Under 20	26.9	(5.1)	28.8	(4.8)	24.8	(2.0)	23.3	(5.7)	25.9	(2.4)
20-25	15.2	(1.5)	23.0	(2.0)	10.3	(1.1)	13.3	(1.3)	15.4	(0.8)
26-34	21.3	(1.2)	28.5	(1.8)	13.0	(1.4)	20.4	(1.3)	22.4	(0.8)
35 or older	23.7	(1.3)	30.2	(1.6)	12.9	(1.1)	26.6	(1.3)	25.8	(0.8)
Females ^b										
Under 20	8.2	(3.1)	+	(+)	+	(+)	6.0	(2.8)	9.2	(2.0)
20-25	6.3	(1.1)	12.3	(2.4)	0.4	(0.4)	3.3	(1.0)	6.2	(0.8)
26-34	9.7	(1.4)	19.9	(2.5)	0.8	(0.6)	8.1	(1.9)	11.3	(1.1)
35 or older	18.1	(2.6)	15.0	(2.2)	4.4	(1.7)	9.3	(1.8)	13.6	(1.3)
Total DoD										
Under 20	22.8	(3.9)	28.4	(4.2)	23.3	(2.1)	18.6	(4.5)	22.9	(2.0)
20-25	13.9	(1.2)	21.2	(1.8)	9.7	(1.1)	11.0	(0.9)	14.0	(0.7)
26-34	19.7	(1.0)	27.6	(1.6)	12.3	(1.3)	18.4	(1.1)	21.0	(0.7)
35 or older	23.0	(1.1)	28.8	(1.5)	12.5	(1.0)	24.5	(1.2)	24.5	(0.7)

Note: Table entries are percentages (with standard errors in parentheses) of personnel meeting criteria for being overweight. Estimates have not been adjusted for sociodemographic differences among Services. Overweight was defined in terms of the Body Mass Index (BMI). Definitions of BMI are given in Section 2.2. New guidelines for what is considered overweight were released in 1998 by the National Heart, Lung, and Blood Institute (NHLBI); however, estimates for this table were generated according to *Healthy People 2000* guidelines in order to evaluate progress toward those objectives. Table 31 presents data using the new NHLBI guidelines.

+Low precision.

^aDefined as being overweight by *Healthy People 2000* if BMI \geq 25.8 for men under age 20 or BMI \geq 27.8 for men aged 20 or older.

^bDefined as being overweight by *Healthy People 2000* if BMI \geq 25.7 for women under age 20 or BMI \geq 27.3 for women aged 20 or older.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Prevalence of Overweight, Q95-96).

overweight. Women in this age group (9.2%) met the objective, while males (25.9%) did not.

- Overall, members of the total DoD aged 20 or older (19.5%, Table 5) met the *Healthy People 2000* objective for their age group, which is no more than 20% prevalence of overweight. Examined separately, all personnel aged 20 to 25 (14.0%) met the objective, while those aged 26 to 34 (21.0%) and those aged 35 or older (24.5%) did not. Women in all three age groups met the objective, but only men aged 20 to 25 did (15.4%) (Table 30).
- For most subgroups in the Military, the prevalence of overweight increased from 1995 to 1998.

Table 31 compares the prevalence of overweight in 1995 and 1998 using *Healthy People 2000* guidelines and new NHLBI guidelines. Estimates show that the NHLBI criteria greatly increase the percentage of personnel considered overweight. These findings are similar to those reported by Harrison, Brennan, and Shilanskis (1998).

7.1.1.2 Underweight. Table 32 presents the prevalence of underweight among active-duty personnel using cutoff points suggested by Brownell and Fairburn (1995).

- The prevalence of underweight was highest among younger DoD personnel. In the total DoD, 12.4% of personnel under 20 were underweight, including about 13% of males and about 9% of females.
- For both men and women in the total DoD, the prevalence of underweight decreased as age increased. Only 2.3% of all DoD personnel aged 35 or older were underweight.

As shown in Table 31, consistent with the findings for overweight prevalence, the new NHLBI guidelines considerably decreased the percentage of personnel considered to be underweight.

7.1.1.3 Exercise. The total DoD and each Service met the *Healthy People 2000* objective of 20% or more of the adult population participating in vigorous physical activity at least 3 days per week for at least 20 minutes per occasion. Strenuous exercise included two types of activities: (a) running, cycling, or walking, and (b) other strenuous exercise, such as swimming laps.

- More than two-thirds of DoD personnel (67.7%) reported that they had engaged in one or both types of strenuous exercise at least 3 days per week for at least 20 minutes per occasion in the past 30 days (data not shown in a table).
- Army (84.8%) and Marine Corps (78.6%) personnel were more likely to exercise at this frequency and duration than were Navy (58.9%) or Air Force (50.0%) personnel (data not shown in a table).

Table 31. Comparison of the Prevalence of Overweight and Underweight Active-Duty Personnel, 1995 and 1998, by Gender, Using Previous Guidelines and 1998 NHLBI Guidelines

	1995		1998	
	Previous Guidelines	NHLBI Guidelines	Previous Guidelines	NHLBI Guidelines
Underweight^a				
Male	5.0 (0.3)	0.7 (0.1)	4.2 (0.3)	0.4 (0.1)
Female	5.2 (0.4)	2.7 (0.3)	4.9 (0.4)	2.8 (0.3)
Total DoD	5.0 (0.2)	0.9 (0.1)	4.3 (0.2)	0.8 (0.1)
Overweight^b				
Male	17.6 (0.4)	53.0 (0.6)	20.7 (0.5)	57.2 (0.5)
Female	8.1 (0.7)	21.0 (0.9)	9.4 (0.6)	25.4 (1.0)
Total DoD	16.4 (0.4)	49.0 (0.6)	19.1 (0.5)	52.9 (0.5)

Note: Table entries are percentages (with standard errors in parentheses) of personnel meeting the criteria for the weight categories indicated. Weight categories were defined in terms of the Body Mass Index (BMI). Definitions of BMI are given in Section 2.2.

^aDefined as being underweight by Brownell and Fairburn (1995) if BMI < 20.7 for men (regardless of age) and < 19.1 for women (regardless of age). National Heart, Lung, and Blood Institute (NHLBI) 1998 guidelines define underweight as BMI < 18.5 for men and women (regardless of age).

^bDefined as being overweight by *Healthy People 2000* guidelines if BMI ≥ 25.8 for men under age 20 or BMI ≥ 27.8 for men aged 20 or older. For women, defined as being overweight by *Healthy People 2000* guidelines if BMI ≥ 25.7 for women under age 20 or BMI ≥ 27.3 for women aged 20 or older. NHLBI 1998 guidelines define four levels of overweight, regardless of age or gender: (1) overweight (BMI of 25.0 to 29.9); (2) obesity I (BMI of 30.0 to 34.9); (3) obesity II (BMI of 35.0 to 39.9); and (4) extreme obesity (BMI of 40.0 or greater). For these analyses, these four levels were aggregated such that personnel were considered overweight if their BMI was ≥ 25.0.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (1998 Questions: Prevalence of Overweight and Underweight, Q95-96).

Table 32. Prevalence of Underweight Active-Duty Personnel, by Age and Gender

Gender/Age Group	Service							
	Army	Navy	Marine Corps	Air Force	Total DoD			
Males^a								
Under 20	16.0 (3.9)	11.5 (3.1)	7.9 (2.2)	17.4 (3.4)	13.1 (1.7)			
20-25	6.3 (0.6)	7.8 (1.9)	6.0 (0.8)	8.4 (2.3)	7.0 (0.7)			
26-34	2.2 (0.5)	2.5 (0.6)	2.5 (0.7)	2.6 (0.4)	2.4 (0.3)			
35 or older	1.3 (0.3)	3.6 (0.7)	1.6 (0.5)	1.9 (0.4)	2.2 (0.3)			
Females^b								
Under 20	8.2 (3.4)	+ (+)	11.8 (5.7)	10.7 (4.9)	9.1 (2.3)			
20-25	4.2 (1.4)	3.9 (1.3)	8.5 (2.2)	8.6 (1.2)	5.9 (0.7)			
26-34	2.7 (0.9)	5.8 (1.4)	5.4 (2.2)	4.9 (1.1)	4.4 (0.6)			
35 or older	2.1 (0.7)	5.1 (1.5)	4.0 (2.2)	2.8 (0.9)	3.2 (0.6)			
Total DoD								
Under 20	14.3 (3.0)	10.8 (2.8)	8.2 (2.4)	15.6 (2.9)	12.4 (1.5)			
20-25	5.9 (0.5)	7.1 (1.6)	6.2 (0.8)	8.5 (1.7)	6.8 (0.6)			
26-34	2.3 (0.5)	2.8 (0.5)	2.6 (0.7)	3.0 (0.4)	2.7 (0.3)			
35 or older	1.4 (0.3)	3.7 (0.6)	1.7 (0.5)	2.0 (0.4)	2.3 (0.2)			

Note: Table entries are percentages (with standard errors in parentheses) of personnel meeting criteria for being underweight. Estimates have not been adjusted for sociodemographic differences among Services. Underweight was defined in terms of the Body Mass Index (BMI). Definitions of BMI are given in Section 2.2. New guidelines for what is considered underweight were released in 1998 by the National Heart, Lung, and Blood Institute (NHLBI); however, estimates for this table were generated according to guidelines in Brownell and Fairburn (1995). Table 31 presents data using the new NHLBI guidelines.

+Low precision.

^aDefined as underweight by Brownell and Fairburn (1995) if BMI < 20.7 for men (regardless of age).

^bDefined as underweight by Brownell and Fairburn (1995) if BMI < 19.1 for women (regardless of age).

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Prevalence of Underweight, Q95-96).

7.1.2 Blood Pressure

7.1.2.1 Blood Pressure Screening and Awareness. Table 33 indicates that the total DoD was about 10 percentage points away from meeting the *Healthy People 2000* objective of 90% for blood pressure screening and awareness.

- About four-fifths (80.4%) of personnel in the total DoD reported that they had their blood pressure checked within the 2 years prior to the survey and could state the result. No subgroup of the DoD met the objective. Though the goal for blood pressure for the total DoD was not attained, the 1998 results represent a statistically significant improvement of approximately 4 percentage points from 1995.
- Sociodemographic groups associated with an increased likelihood of meeting these blood pressure criteria were females, non-Hispanic Caucasians, college graduates, those 35 or older, and those in the Air Force.

These findings suggest that rates for blood pressure screening and awareness that are below the objective may likely be due to some personnel having limited ability to recall when they last had their blood pressure checked or what the result was, particularly among younger or less educated personnel.

7.1.2.2 High Blood Pressure. Awareness of blood pressure status is important because high blood pressure does not usually have symptoms and can have long-term negative effects on health and well-being. Results of the 1998 survey showed the following:

- Approximately one in seven DoD personnel (14.2%) reported ever being diagnosed as having high blood pressure (data not shown in a table).
- About 66% of DoD personnel who had ever had high blood pressure had been advised to take one or more of the following actions to help lower their blood pressure: take blood pressure medication, diet to reduce weight, reduce sodium intake, or exercise (data not shown in a table). Recommendations to reduce salt in one's diet (51.3%) and to exercise (50.3%) were most common (data not shown in a table).
- About 47% of DoD personnel who had ever been diagnosed with hypertension reported currently taking one or more of these recommendations (data not shown in a table). This estimate is well below the *Healthy People 2000* goal of 90% or more people with hypertension taking action to control their blood pressure.

Table 33. Blood Pressure Screening and Awareness, by Selected Sociodemographic Characteristics

Characteristic	Service				Total DoD
	Army	Navy	Marine Corps	Air Force	
Gender					
Male	79.7 (1.1)	81.2 (1.0)	74.0 (1.3)	82.5 (1.1)	80.1 (0.6)
Female	81.9 (1.4)	82.3 (2.3)	79.0 (1.6)	83.2 (1.2)	82.3 (0.9)
Race/Ethnicity					
Caucasian, non-Hispanic	82.0 (1.2)	83.1 (1.0)	75.8 (1.6)	82.9 (1.2)	81.8 (0.6)
African American, non-Hispanic	78.6 (1.5)	78.2 (2.4)	74.9 (1.8)	83.5 (2.0)	79.1 (1.0)
Hispanic	76.8 (2.4)	75.1 (3.0)	69.8 (2.4)	78.7 (2.1)	75.6 (1.3)
Other	73.8 (3.2)	80.3 (2.9)	69.5 (4.3)	83.0 (3.1)	78.0 (1.7)
Education					
High school or less	73.4 (1.5)	75.1 (1.5)	69.9 (1.3)	73.6 (1.8)	73.2 (0.8)
Some college	80.0 (1.2)	83.4 (1.8)	76.0 (1.7)	82.1 (1.3)	81.1 (0.7)
College graduate or higher	89.1 (1.3)	88.4 (1.0)	87.6 (2.0)	89.4 (1.3)	88.9 (0.7)
Age					
20 or younger	69.6 (2.9)	72.7 (3.4)	66.5 (1.5)	70.2 (2.8)	69.5 (1.5)
21-25	73.9 (1.4)	74.5 (1.8)	69.6 (1.6)	77.8 (2.6)	74.2 (0.9)
26-34	83.0 (1.3)	81.3 (1.1)	80.5 (1.6)	84.1 (0.9)	82.6 (0.6)
35 or older	89.5 (0.9)	88.5 (1.0)	86.3 (1.6)	87.2 (1.3)	88.2 (0.6)
Total	80.0 (1.0)	81.4 (0.8)	74.3 (1.3)	82.6 (1.1)	80.4 (0.5)

Note: Table entries are percentages (with standard errors in parentheses) of personnel who had their blood pressure checked in the 2 years prior to the survey and who knew the result. Estimates have not been adjusted for sociodemographic differences among Services.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Blood Pressure Screening and Awareness, Q97-98; refer to Section 2.2 for descriptions of sociodemographic variables).

7.1.3 Cholesterol

The *Healthy People 2000* objective of at least 75% of adults having their blood cholesterol checked had been met by some subgroups of the Military but not by the total DoD.

- In the total DoD, approximately 62% of personnel had their cholesterol checked within the 5 years before the 1998 survey (data not shown in a table).
- Subgroups of the Military who met the *Healthy People 2000* objective were: personnel aged 25 to 49 in the Army (76.8%) and Air Force (if the Air Force estimate is rounded) (74.7%), and personnel aged 50 or older in the total DoD (95.3%), Army (92.5%), Navy (100.0%), and Marine Corps (100.0%) (data not shown in a table).
- Approximately 18% of the total DoD had ever been told by a health care provider that they had high cholesterol; rates among Services ranged from 9.5% for the Marine Corps to 20.7% among Navy personnel (data not shown in a table).
- Due to the advice of a health care provider, approximately 12% of the total DoD at the time of the survey were limiting their dietary fat, and about 1% were taking medication to lower cholesterol (data not shown in a table).

Military regulations may have a bearing on which groups meet the *Healthy People 2000* objective because older personnel are required to have cholesterol checks more frequently.

7.2 Injuries and Injury Prevention

A major effort in injury prevention is to reduce injuries sustained in motor vehicle crashes and motor vehicle fatalities. In 1997, an estimated 3.4 million people were injured in motor vehicle crashes (National Highway Traffic Safety Administration [NHTSA], 1997). Research demonstrates, however, that seat belts are very effective in preventing injury and reducing the likelihood of death in motor vehicle crashes (NHTSA, 1996). Injuries to motorcyclists and bicyclists also are of concern. In 1997, motorcycle and bicycle fatalities accounted for 5% and 2%, respectively, of all traffic fatalities (NHTSA, 1997). Motorcycle and bicycle helmets, however, can decrease the risk of head injuries in a crash or fall (Sacks, Holmgreen, Smith, & Sosin, 1991; Sosin, Sacks, & Holmgreen, 1990; Thompson, Rivara, & Thompson, 1989).

7.2.1 Prevalence of Injuries

Hospitalization for injuries impacts the overall health and readiness of the military population. In the total DoD in 1998, 3,271 per 100,000 personnel reported

injuries that required overnight hospitalization (data not shown in a table). This is well above the *Healthy People 2000* objective to reduce these injuries to no greater than 754 per 100,000 people. In 1998, those in the Army were most likely to be injured (4,321 per 100,000), but this represents a decrease from 5,002 per 100,000 in 1995 (data not shown in a table). For the other three Services and the total DoD, estimates did not change greatly from 1995 to 1998 (data not shown in a table).

It should be noted that the *Healthy People 2000* objective for hospitalization for injuries refers specifically to unintentional injuries. The 1995 and 1998 DoD survey measure of hospitalization for injuries does not distinguish between unintentional injuries and intentional injuries. Intentional injuries are those that result from deliberate intent to harm an individual or oneself (e.g., assault, suicide) and differ from injuries that result from other agents or events (e.g., running injury, motor vehicle crash). To have examined the distinction between unintentional and intentional injuries in the survey would have required the addition of a series of questions and skip patterns. Due to space limitations and the expectation that few injuries experienced by military personnel would be intentional injuries, we asked just about the overall rate of injuries. Because the number of hospitalizations due to intentional injuries is likely to be small, the high rate of hospitalizations for injuries for both 1995 and 1998 cannot be explained by *intentional* injuries. Importantly, efforts to address high rates of injury in the Military are under way, most recently with the formation of the Injury Prevention and Control Work Group of the Armed Forces Epidemiologic Board (Jones & Hansen, 1996).

7.2.2 Seat Belt Use

Table 34 shows that the total DoD met the *Healthy People 2000* objective of 85% or more motor vehicle occupants using occupant protection systems, although some subgroups did not.

- About 91% of military personnel reported that they wore seat belts "always" or "nearly always" when driving or riding in a motor vehicle.
- In addition, in the total DoD, females (96.2%) were more likely than males (90.7%) to report seat belt use "always" or "nearly always." This pattern held in each age group and in each Service.
- Males aged 25 or younger in the total DoD (and in the Army and Marine Corps separately) did not meet the *Healthy People 2000* objective for seat belt use.

Comparison of civilian survey data with actual observation of motor vehicle occupants suggests that overreporting of seat belt use could be occurring (Siegel et al., 1991).

Table 34. Seat Belt Use, by Gender and Age

Gender/Age Group	Service				Total DoD	
	Army	Navy	Marine Corps	Air Force		
Male						
20 or younger	67.5 (5.1)	87.9 (4.3)	81.0 (2.7)	92.8 (2.6)	79.0 (2.6)	
21-25	78.3 (3.0)	87.7 (2.7)	83.5 (1.3)	91.2 (1.4)	83.9 (1.4)	
26-34	91.6 (1.5)	93.8 (1.1)	95.1 (0.6)	96.1 (0.8)	93.9 (0.6)	
35 or older	95.3 (0.9)	96.0 (0.8)	96.0 (0.7)	98.2 (0.6)	96.5 (0.4)	
Total	86.3 (1.8)	92.8 (1.2)	88.1 (0.7)	95.5 (0.5)	90.7 (0.7)	
Female						
20 or younger	94.1 (3.0)	+ (+)	89.1 (2.5)	100.0 (NA)	94.8 (1.7)	
21-25	94.6 (1.1)	93.9 (1.0)	91.7 (2.6)	97.4 (1.0)	95.2 (0.6)	
26-34	94.2 (1.5)	97.2 (1.2)	96.6 (1.2)	96.3 (1.4)	95.8 (0.8)	
35 or older	97.6 (0.7)	99.1 (0.6)	97.3 (1.5)	100.0 (NA)	98.9 (0.3)	
Total	95.1 (1.0)	96.1 (0.7)	93.3 (1.2)	97.7 (0.6)	96.2 (0.4)	
Total						
20 or younger	73.2 (4.5)	88.2 (3.4)	81.6 (2.5)	94.7 (2.1)	81.8 (2.2)	
21-25	80.7 (2.6)	88.8 (2.4)	84.0 (1.2)	92.7 (1.1)	85.7 (1.2)	
26-34	92.0 (1.4)	94.2 (0.9)	95.2 (0.6)	96.1 (0.8)	94.1 (0.6)	
35 or older	95.6 (0.8)	96.3 (0.8)	96.1 (0.7)	98.4 (0.5)	96.8 (0.4)	
Total	87.5 (1.7)	93.2 (1.1)	88.4 (0.6)	95.9 (0.5)	91.4 (0.7)	

Note: Table entries are percentages (with standard errors in parentheses) of personnel who reported that they used seat belts "always" or "nearly always" when driving or riding in a car. Personnel who reported that they did not drive or ride in a car were excluded from these analyses. Estimates have not been adjusted for sociodemographic differences among Services.

+Low precision.

NA = Not applicable.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Seat Belt Use, Q72).

7.2.3 Helmet Use

The *Healthy People 2000* objectives for helmet use while riding a motorcycle or bicycle had not yet been attained in 1998 within the military population (Table 35).

- Among DoD personnel who rode a motorcycle in the past 12 months, 75.9% wore helmets "always" or "nearly always." This rate, although a significant increase since 1995, was slightly below the *Healthy People 2000* objective of 80% or greater use of helmets among motorcyclists. All Air Force personnel (and men and women separately) exceeded this objective.
- About 44% of DoD personnel who rode a bicycle in the past 12 months wore a helmet "always" or "nearly always" while doing so. This

Table 35. Helmet Use Among Motorcyclists and Bicyclists, Past 12 Months, by Gender

Gender	N	Service				Total DoD
		Army	Navy	Marine Corps	Air Force	
Males						
Motorcyclists	3,542	73.6 (1.6)	76.1 (2.0)	70.1 (2.4)	82.7 (1.5)	75.8 (0.9)
Bicyclists	8,213	47.2 (3.1)	40.4 (3.7)	31.9 (2.4)	49.1 (3.2)	44.0 (1.7)
Females						
Motorcyclists	887	69.5 (2.8)	75.1 (4.8)	77.5 (6.6)	82.8 (3.5)	76.0 (2.0)
Bicyclists	1,862	47.9 (3.3)	44.2 (4.2)	30.6 (4.4)	48.1 (4.1)	46.3 (2.1)
Total						
Motorcyclists	4,429	73.2 (1.5)	76.0 (2.1)	70.5 (2.4)	82.7 (1.4)	75.9 (0.9)
Bicyclists	10,075	47.3 (2.9)	40.8 (3.6)	31.8 (2.4)	48.9 (3.2)	44.2 (1.7)

Note: Table entries are percentages (with standard errors in parentheses) of personnel who reported wearing helmets "always" or "nearly always" when they rode a motorcycle or bicycle. *N*'s are unweighted counts of respondents in the total DoD sample who rode a motorcycle or bicycle in the past 12 months.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Helmet Use for Motorcyclists, Q75; for Bicyclists, Q77).

estimate represents a significant increase from approximately 23% in 1995, but does not reach the *Healthy People 2000* goal of 50% or greater use of helmets among bicyclists.

7.3 Sexually Transmitted Disease Risk Reduction

Although either abstinence from sexual intercourse or sexual activity within a mutually monogamous relationship is the most effective means of preventing sexually transmitted diseases (STDs, including AIDS), proper use of latex condoms can reduce the risk of contracting STDs among individuals who are sexually active but not in a monogamous relationship. In the United States, failure of condoms to prevent transmission of disease is due more often to improper use than to product defects (CDC, 1988).

7.3.1 Prevalence of Sexually Transmitted Disease

Military women reported a higher lifetime prevalence of STDs than did men, as shown in Table 36. Lifetime prevalence of STDs was about one in five personnel, while prevalence in the past year was much lower.

- About 19% of DoD personnel had ever had an STD. Lifetime prevalence rates for men in the total DoD and in individual Services were comparable to the overall rate.

Table 36. Prevalence of Sexually Transmitted Disease, by Gender

Gender/Time Period	Service				Total DoD
	Army	Navy	Marine Corps	Air Force	
Males					
Lifetime	18.3 (1.1)	20.2 (1.0)	15.8 (1.3)	15.4 (1.2)	17.7 (0.6)
Past 12 months	0.2 (0.1)	0.1 (0.1)	0.1 (0.1)	0.1 (0.1)	0.1 (**)
Females					
Lifetime	29.5 (1.7)	26.3 (2.1)	23.3 (1.9)	22.2 (1.4)	25.8 (1.0)
Past 12 months	0.6 (0.2)	0.5 (0.3)	0.5 (0.2)	** (**)	0.4 (0.1)
Total					
Lifetime	19.9 (1.2)	20.9 (1.0)	16.2 (1.2)	16.6 (1.1)	18.8 (0.6)
Past 12 months	0.2 (0.1)	0.1 (0.1)	0.2 (0.1)	0.1 (**)	0.2 (**)

Note: Table entries are percentages of personnel (with standard errors in parentheses) who had had an STD in their lifetime or the past 12 months. Estimates have not been adjusted for sociodemographic differences among Services.

**Estimate rounds to zero.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Sexually Transmitted Disease: Lifetime Q120, Past 12 Months, Q119).

- Women had higher lifetime prevalence of STDs, with approximately 26% of DoD women reporting ever having had an STD. This represents a cause for concern as this difference between women and men may reflect the greater efficiency of STD transmission from male to female rather than from female to male in heterosexual intercourse (Fleming et al., 1997). Among DoD women, lifetime prevalence rates were approximately 22% in the Air Force, 23% in the Marine Corps, 26% in the Navy, and 30% in the Army.
- Fewer than 1% of personnel in the total DoD (0.2%) and in each Service reported having an STD in the preceding year. This was true for both male and female DoD personnel.

The low numbers for the past 12 months surely underrepresent the true STD burden due to the chronic and incurable viral infections carried in the population at any given time. Even though the 1998 DoD survey questionnaire asked respondents about their experience with STDs in the past 12 months and specifically named genital herpes, it is possible that respondents did not answer affirmatively if a chronic viral STD were present prior to the past 12 months, or if they had an infection that was asymptomatic.

7.3.2 Condom Use

Condom use was measured among sexually active unmarried personnel (Table 37) and among all sexually active personnel (data not shown in a table). We asked questions about condom use in a variety of situations, including onetime encounters, with casual partners, and in ongoing relationships. For consistency with 1995 estimates, the 1998 data on sexually active *unmarried* personnel do not include personnel who were living as married.

- About 42% of sexually active unmarried personnel in the total DoD used a condom the last time they had intercourse. The total DoD rate and rates for individual Services were all lower than the *Healthy People 2000* objective of condom use at the last episode of sexual intercourse by at least 50% of sexually active unmarried individuals.
- The rate of reported condom use was higher among males, younger personnel, and those who had more than one sexual partner in the past 12 months. Differences in condom use by education and enlisted/officer status were small.

The type of sexual relationship reported by all sexually active personnel affected their condom use behavior (data not shown in a table).

- The majority of those who engaged in one or more onetime encounters in the past 12 months used a condom every time or most of the time (51.9% for those with one partner, 69.8% for those with two to four partners, and 69.9% for those with five or more partners) (data not shown in a table).
- Among these personnel who had sex with any casual partner in the past 12 months, approximately 58% to 79% used condoms half the time or less.
- As might be expected, those personnel reporting one ongoing relationship used condoms least frequently, with only about 12% reporting condom use every time or most of the time (data not shown in a table).

7.3.3 Knowledge and Beliefs About AIDS

To gauge knowledge about HIV and AIDS transmission, we asked personnel to respond to questions related to the possibility of HIV transmission through a variety of casual contacts. There was evidence of misconceptions regarding the likelihood of HIV transmission through casual contact. About 22% of DoD personnel believed that eating in a dining facility in which the cook has the AIDS virus would present a "very likely" or "somewhat likely" means of infection, and approximately 24% believed the same for sharing eating utensils with someone who has the AIDS virus (data not shown in a table). Although significant misconceptions still exist, a decrease has occurred since 1995.

Table 37. Condom Use at Last Encounter Among Sexually Active Unmarried Personnel, by Selected Sociodemographic Characteristics

Characteristic/Group	Service				Total DoD
	Army	Navy	Marine Corps	Air Force	
All Sexually Active Unmarried Personnel	44.3 (2.2)	38.9 (1.9)	42.4 (0.9)	40.3 (1.6)	41.8 (1.0)
Gender					
Male	46.2 (2.4)	40.4 (2.3)	43.7 (1.0)	42.0 (2.1)	43.4 (1.1)
Female	35.8 (2.7)	31.3 (2.6)	24.2 (3.7)	34.8 (2.7)	33.8 (1.5)
Age					
20 or younger	48.9 (3.3)	37.5 (5.4)	44.3 (2.1)	48.2 (3.2)	46.0 (1.8)
21-25	44.4 (3.1)	43.8 (3.9)	42.4 (1.6)	45.1 (2.7)	44.0 (1.6)
26-34	41.4 (3.7)	38.9 (3.2)	43.0 (4.9)	35.1 (3.1)	39.0 (1.8)
35 or older	40.2 (2.9)	25.7 (4.8)	28.0 (4.7)	29.8 (5.0)	31.7 (2.5)
Education					
High school or less	44.2 (2.5)	44.9 (2.4)	42.5 (1.2)	45.4 (4.1)	44.2 (1.3)
Some college	45.2 (3.3)	30.9 (3.4)	41.1 (2.4)	38.6 (1.7)	39.6 (1.5)
College graduate	41.8 (2.9)	43.5 (4.1)	47.9 (2.8)	38.2 (4.2)	41.7 (1.9)
Pay Grade					
Enlisted	44.4 (2.3)	38.4 (2.0)	42.2 (0.9)	40.2 (1.4)	41.6 (1.0)
Officer	43.7 (3.2)	44.0 (5.3)	48.1 (3.1)	41.4 (5.1)	43.5 (2.3)
Number of Partners, Past 12 Months					
1 partner	34.8 (3.2)	35.5 (2.7)	38.2 (2.1)	35.5 (2.2)	35.7 (1.4)
2-4 partners	46.2 (2.8)	42.4 (3.1)	44.0 (1.3)	41.8 (2.1)	43.9 (1.4)
5 or more partners	55.2 (3.1)	39.4 (3.1)	45.3 (2.0)	48.8 (4.7)	48.8 (1.7)

Note: Table entries are percentages (with standard errors in parentheses) of unmarried personnel who had one or more sexual partners in the past 12 months (N=4,932). For consistency with 1995 estimates, the 1998 estimates do not include personnel who are living as married.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Condom Use, Q113 and 114; refer to Section 2.2 for descriptions of sociodemographic variables).

7.4 Summary

This chapter examined a variety of health behaviors, health outcomes, and health promotion activities, evaluating for many progress toward *Healthy People 2000* objectives made since 1995. Findings indicate that the Military in 1998 had met the *Healthy People 2000* objective for exercise, and many segments of the military population had met the objective for overweight. The estimates for some subgroups, however, were above the relevant *Healthy People 2000* objectives. Moreover, for most subgroups the prevalence of overweight has increased since 1995, signaling an area in need of improvement. Using new guidelines from the National Heart, Lung, and Blood Institute (NHLBI) markedly increased the percentage of military personnel considered to be overweight because of a lowering of the criteria for defining overweight. The total DoD and some of the Services also met the objective for cholesterol screening in the past 5 years among personnel in some age groups. Given the emphasis on fitness and readiness in the Military, and the access to preventive medical services, it is not surprising that these objectives have already been reached for the Military as a whole or among some segments of the military population.

In addition, rates of regular seat belt use suggest that most segments of the military population in 1998 had met the *Healthy People 2000* objective related to use of occupant protection systems by motor vehicle occupants. Military regulations mandating that personnel wear their seat belts when on military installations were probably an important contributor to high rates of regular seat belt use among military personnel. Notably, helmet use for motorcyclists and especially bicyclists had increased since 1995 but still fell short of *Healthy People 2000* goals.

Findings from the 1998 DoD survey also suggest that additional effort will be needed to meet *Healthy People 2000* objectives in the areas of

- blood pressure screening and awareness,
- actions taken to control high blood pressure among personnel with a history of high blood pressure,
- the occurrence of injuries that require hospitalization,
- helmet use among motorcyclists and bicyclists, and
- condom use among sexually active unmarried personnel.

In addition to behavior related to *Healthy People 2000* goals, several other health issues were examined in the 1998 survey. For the first time in the survey series, the prevalence of underweight personnel was examined, and data indicated that being underweight was most prominent among younger personnel. Investigation of the

prevalence of sexually transmitted diseases (STDs) revealed a higher rate of STDs among women, which as mentioned earlier, is a cause of concern due to the greater efficiency of STD transmission from male to females. Condom use among all sexually active personnel was related to the type of sexual relationship of personnel. Finally, questions asked about HIV and AIDS transmission showed that sizable percentages of military personnel held misconceptions about transmission through casual contact.

Taken together, the estimates presented in this chapter both highlight health behavior and promotion areas where the Military is doing well and emphasize areas where continued effort is needed. Estimates from subsequent surveys will help gauge whether progress has been made in improving poor health outcomes or behaviors as well as in meeting relevant *Healthy People 2000* objectives.

8. MENTAL HEALTH, STRESS, AND COPING

The demand characteristics of the military environment are such that many stressors are inherent (Orasanu & Backer, 1996). To assess the impact of these stressors, the 1998 DoD survey contained a set of questions about the mental health of active-duty personnel. Respondents were asked to appraise their levels of stress at work and in their personal relationships, identify specific sources of stress, estimate the impact of stress on their military performance, and indicate the ways in which they coped with the stress in their lives. We also screened personnel for symptoms of depression and examined relationships among stress, depression, and alcohol use. Finally, we assessed the use of, perceived need for, and perceived career damage associated with mental health counseling. The patterns of findings were similar across all Services; therefore, findings will be reported for the total DoD unless otherwise noted.

8.1 Levels and Sources of Stress

Psychosocial theories of stress generally recognize the importance of cognitive factors in the development and maintenance of stress-related symptoms and problems in life functioning. Folkman and Lazarus (1980, 1985), for example, proposed a psychosocial model that emphasizes the important role that appraisal plays in the development and maintenance of stress-related problems. A number of experimental and applied studies have shown robust relationships between individuals' appraisal of the level of stress associated with specific life events and their capacity to function effectively (cf. Foa, Steketee, & Olatov Rothbaum, 1989). We asked Military personnel to rate the levels of stress they perceived to be associated both with their job and their family life.

The findings for perceived level of stress are shown in Table 38, and those for sources of stress are shown in Table 39. In the total DoD, higher percentages of military personnel rated their jobs as more stressful than their personal lives. Overall, there was a great deal of similarity in sources of stress for women and men, but a few differences did emerge.

- The most frequently indicated stressor for both men (19.5%) and women (19.5%) was separation from family.
- More men (12.9%) than women (7.8%) reported stress due to deployment.
- More women (17.9%) than men (13.5%) reported stress related to changes in the family.

Table 38. Levels of Perceived Stress at Work and in Family Life, Past 12 Months, by Service

Type of Stress/ Level	Service				Total DoD
	Army	Navy	Marine Corps	Air Force	
Stress at Work					
Great deal	18.1 (1.0)	15.1 (0.9)	16.5 (0.8)	14.6 (0.8)	16.1 (0.5)
Fairly large amount	22.2 (1.3)	20.7 (1.2)	23.0 (0.8)	23.0 (0.8)	22.1 (0.6)
Some	30.4 (0.8)	30.5 (0.9)	31.0 (0.9)	31.5 (0.5)	30.8 (0.4)
A little	18.7 (1.0)	21.4 (1.1)	18.8 (0.9)	20.5 (0.8)	19.9 (0.5)
None	10.6 (0.8)	12.4 (0.8)	10.7 (0.6)	10.4 (0.6)	11.0 (0.4)
Stress in Family					
Great deal	11.7 (0.7)	9.8 (0.6)	10.7 (0.3)	9.4 (0.6)	10.4 (0.3)
Fairly large amount	13.0 (0.5)	12.9 (0.5)	12.9 (0.6)	12.6 (0.7)	12.8 (0.3)
Some	26.5 (1.2)	27.5 (0.9)	27.8 (0.6)	28.0 (0.8)	27.3 (0.5)
A little	27.9 (0.9)	30.7 (0.9)	27.4 (0.8)	31.5 (1.0)	29.6 (0.5)
None	20.9 (0.9)	19.2 (0.9)	21.2 (1.0)	18.6 (0.6)	19.9 (0.5)

Note: Table entries are column percentages (with standard errors in parentheses). Estimates have not been adjusted for sociodemographic differences among Services.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Stress at Work, Q82; Stress in Family, Q83).

8.2 Stress and Productivity Loss

When we examined the relation between stress and productivity loss in the Military, a consistent pattern emerged. Compared to their less-stressed counterparts, personnel experiencing high levels of job-related or family-related stress showed a greater prevalence of productivity loss in each of the domains assessed (being late for work by at least 30 minutes, leaving work early, being hurt in an on-the-job accident, working below normal performance level, not coming to work because of an illness or injury). Two findings were particularly salient:

- Working below normal performance level was reported by 42.6% of the high-stress group compared to 25.4% of the moderate/low-stress group (data not shown in a table). This difference was especially notable at the highest frequency (i.e., 4 or more days in the past year).
- Injuries due to accidents in the workplace were twice as common in the high-stress group (12.9%) as in the moderate/low-stress group (6.4%) (data not shown in a table).

Table 39. Specific Sources of Stress, Past 12 Months, by Gender, Total DoD

Stressor	Gender		Total DoD
	Men	Women	
Deployment	12.9 (0.9)	7.8 (0.8)	12.2 (0.8)
Having a PCS ^a	9.4 (0.6)	10.1 (0.6)	9.5 (0.6)
Work relationships	11.4 (0.4)	15.4 (0.9)	12.0 (0.4)
Problems with supervisor	10.7 (0.4)	13.3 (0.7)	11.0 (0.4)
Concern about performance rating	8.1 (0.4)	7.8 (0.6)	8.1 (0.3)
Increases in work load	17.7 (0.5)	17.1 (0.9)	17.6 (0.5)
Decreases in work load	1.5 (0.1)	2.0 (0.3)	1.5 (0.1)
Being away from family	19.5 (1.0)	19.5 (1.0)	19.5 (0.9)
Changes in family	13.5 (0.5)	17.9 (0.8)	14.1 (0.4)
Conflicts between military and family responsibilities	14.0 (0.6)	13.6 (0.6)	14.0 (0.5)
Financial problems	15.5 (0.6)	14.2 (0.7)	15.3 (0.5)
Housing problems	7.3 (0.4)	5.7 (0.5)	7.1 (0.3)
Personal health problems	4.6 (0.3)	8.8 (0.6)	5.2 (0.3)
Family health problems	8.4 (0.3)	9.1 (0.5)	8.5 (0.3)
Behavior problems in children	4.2 (0.2)	4.9 (0.3)	4.3 (0.2)

Note: Table entries are percentages (with standard errors in parentheses) of personnel who reported "a great deal" or a "fairly large amount" of stress in the past 12 months.

^aPCS = Permanent change of station.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Specific Sources of Stress, Q90A-O).

These findings are consistent with an extensive body of research (e.g., Kanki, 1996; Orasanu & Backer, 1996) that shows a strong relation between high levels of stress and impaired occupational functioning, including increased absenteeism, lower levels of productivity, and more interpersonal problems. A caveat to this finding is that it cannot be stated definitively that higher levels of stress are *causing* reduced performance. It could be that lower productivity (e.g., frequently working below normal performance level, or being hurt on the job more often than others) causes individuals to feel higher levels of stress. Regardless of the direction of the relationship, however, it is clear that stress and job performance are associated. It is likely that Service personnel who are experiencing high levels of stress at work, in their personal lives, or in both of these domains are at increased risk for a host of adverse psychological and health conditions.

8.3 Coping with Stress and Depressive Symptoms

Coping has been defined in terms of the strategies and processes that individuals use to modify adverse aspects of their environment, as well as to minimize internal distress induced by environmental demands (Lazarus, 1966; Moos & Billings, 1982). An important

dimension of coping is the distinction between problem-focused coping strategies (efforts to recognize, modify, or eliminate the impact of a stressor), emotion-focused coping strategies (efforts to regulate negative emotions that occur in reaction to a stressor event), and avoidance strategies (efforts to avoid dealing with the stressor). Although the utility of any approach depends on the demands of the situation and the skill and flexibility of individuals in using various coping strategies, preference for an avoidance strategy has been linked with a greater risk of mental health problems in military personnel, especially when they are faced with a radically changing environment (Johnsen, Laberg, & Eid, 1998).

We found that the most commonly used strategies for coping with stress were using a problem-solving approach, seeking social support, and engaging in physical activity (see Table 40). These encouraging findings are tempered somewhat by the finding that nearly a quarter of military personnel commonly used alcohol to cope with stress, daily pressures, and feelings of depression:

- More men (24.6%) than women (15.5%) reported using alcohol as a coping behavior. Women were more likely than men to talk to a friend or family member (87.1% vs. 70.8%, respectively), or to use prayer (72.5% vs. 50.5%, respectively) as a coping strategy. Women (53.4%) also were more likely than men (41.9%) to get something to eat as a coping strategy.
- Approximately 4% of both male and female military personnel had considered suicide as an option for dealing with stress and depression.

Table 40. Behaviors for Coping with Stress, by Gender, Total DoD

Coping Behavior	Gender		Total DoD
	Men	Women	
Talk to friend/family member	70.8 (0.5)	87.1 (0.7)	73.0 (0.5)
Light up a cigarette	25.3 (0.7)	23.1 (1.0)	25.0 (0.7)
Have a drink	24.6 (0.7)	15.5 (0.6)	23.3 (0.6)
Say a prayer	50.5 (0.7)	72.5 (1.1)	53.5 (0.7)
Exercise or play sports	61.9 (0.9)	58.7 (1.1)	61.5 (0.8)
Engage in a hobby	56.3 (0.5)	52.6 (1.0)	55.8 (0.4)
Get something to eat	41.9 (0.5)	53.4 (1.1)	43.5 (0.5)
Smoke marijuana/use illegal drugs	1.3 (0.2)	0.6 (0.2)	1.2 (0.2)
Think of plan to solve problem	86.4 (0.5)	89.4 (0.6)	86.8 (0.4)
Consider hurting or killing yourself	4.0 (0.3)	4.4 (0.3)	4.1 (0.3)

Note: Table entries are percentages (with standard errors in parentheses) of personnel who "frequently" or "sometimes" engage in a behavior when they feel pressured, stressed, depressed, or anxious.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Coping Behavior, Q91A-J).

8.4 Screening for Depression

We included four items similar to those frequently used in psychiatric epidemiologic surveys to screen for the presence of possible depressive symptoms and syndromes. We found that 16.1% of the total DoD was in need of further evaluation for depression (see Table 41).

- The percentages of personnel in need of further depression evaluation ranged from 12.5% in the Air Force to 18.9% in the Army.
- Consistent with findings from psychiatric epidemiologic studies, a somewhat greater percentage of women (20.6%) scored above the threshold on a depression screener than did men (15.3%).
- Higher percentages of those who were younger, less educated, living without a spouse, and in the lower enlisted pay grades endorsed screening items indicative of a need for further evaluation for depression.

These differences should be interpreted with some caution, recognizing that the differences were relatively small in magnitude, and that comprehensive assessment procedures are required to identify cases of specific psychiatric disorders, such as major depressive disorder.

Because depressive symptoms are common in the Military, and because these symptoms can affect military readiness, we further analyzed the data of personnel who met the criterion for need for further depression evaluation. These analyses revealed some potentially important findings:

- Personnel in need of further evaluation for depression reported higher levels of stress than their counterparts who did not meet the criterion. Among the group with symptoms of depression, the most frequently endorsed stress level for both work (40.1%) and family (30.5%) was "a great deal."
- Although coping strategies were used more than less productive ones by personnel in need of further depression evaluation, several unproductive strategies were reported by a fairly large percentage (see Table 42). The most disturbing finding was the high rate among the "need further evaluation" group for considering self-injury or suicide as a coping mechanism (18.3%) compared to others (1.3%).
- Productivity loss was higher among personnel in need of further evaluation for depression than it was among those who did not need this evaluation. This was especially apparent in work-related injuries (18.5% vs. 7.8%) and working below normal performance level (52.3% vs. 30.0%).

Table 41. Need for Further Depression Evaluation, by Selected Sociodemographic Characteristics

Sociodemographic Characteristic	Service				Total DoD
	Army	Navy	Marine Corps	Air Force	
Gender					
Male	18.1 (0.7)	15.0 (1.1)	16.6 (1.1)	11.6 (0.7)	15.3 (0.5)
Female	23.5 (1.8)	20.6 (1.9)	25.8 (2.6)	17.0 (0.7)	20.6 (0.8)
Race/Ethnicity					
Caucasian, non-Hispanic	18.0 (1.2)	14.6 (1.0)	16.9 (1.0)	12.6 (0.6)	15.2 (0.5)
African American, non-Hispanic	19.2 (1.7)	17.8 (2.0)	15.3 (1.4)	10.8 (1.3)	16.9 (1.0)
Hispanic	22.2 (3.0)	17.9 (2.6)	18.8 (2.1)	15.8 (2.7)	19.3 (1.5)
Other	18.9 (1.8)	17.8 (2.0)	19.4 (2.3)	11.4 (1.6)	16.6 (1.0)
Education					
High school or less	26.4 (1.0)	17.1 (1.4)	19.2 (1.5)	13.4 (1.3)	20.0 (0.8)
Some college	18.5 (0.9)	16.6 (1.1)	18.1 (1.1)	13.0 (0.9)	16.2 (0.5)
College graduate or higher	9.4 (0.8)	11.3 (1.6)	6.1 (1.1)	11.2 (0.7)	10.3 (0.5)
Age					
20 or younger	25.6 (2.2)	22.7 (4.1)	25.6 (1.5)	21.2 (2.0)	24.3 (1.2)
21-25	26.4 (1.0)	20.5 (1.6)	21.4 (1.4)	15.1 (0.9)	21.6 (0.7)
26-34	15.4 (1.0)	14.6 (1.2)	9.9 (1.2)	11.3 (0.8)	13.5 (0.5)
35 or older	10.3 (1.1)	11.8 (1.3)	6.8 (0.8)	10.2 (0.9)	10.4 (0.6)
Family Status^a					
Not married	24.2 (0.8)	21.9 (1.7)	22.8 (1.1)	16.5 (0.8)	21.5 (0.6)
Married, spouse not present	26.4 (4.2)	16.6 (2.9)	19.3 (3.5)	16.5 (1.9)	21.9 (2.3)
Married, spouse present	13.2 (0.8)	11.3 (0.9)	10.4 (1.0)	10.0 (0.7)	11.4 (0.4)
Pay Grade					
E1-E3	31.8 (1.9)	22.6 (3.4)	25.9 (1.5)	18.5 (1.4)	25.4 (1.1)
E4-E6	20.0 (0.6)	16.8 (1.3)	15.7 (1.3)	12.0 (0.9)	16.4 (0.5)
E7-E9	10.5 (1.3)	11.4 (1.5)	6.2 (1.1)	11.0 (1.6)	10.4 (0.8)
W1-W5	8.3 (1.0)	+ (+)	3.9 (1.4)	NA (NA)	9.1 (1.3)
O1-O3	8.7 (1.0)	9.5 (2.3)	4.3 (1.8)	9.8 (1.0)	9.0 (0.8)
O4-O10	8.2 (1.2)	6.6 (1.0)	4.5 (0.8)	10.3 (1.2)	8.3 (0.7)
Region					
CONUS ^b	18.7 (0.9)	14.3 (1.0)	16.4 (1.3)	12.4 (0.6)	15.6 (0.5)
OCONUS ^c	19.4 (0.8)	18.7 (1.7)	20.0 (0.4)	12.9 (1.3)	17.5 (0.7)
Total	18.9 (0.7)	15.7 (0.9)	17.1 (1.0)	12.5 (0.6)	16.1 (0.4)

Note: Table entries are percentages (with standard errors in parentheses). Estimates have not been adjusted for sociodemographic differences among Services. The definition for need for further depression evaluation is given in Section 2.2.

+Low precision.

NA = Not applicable.

^aEstimates by family status in 1998 are not strictly comparable to those from other survey years. In 1998, personnel who reported that they were living as married were classified in the "not married" group. In prior years, the marital status questions did not distinguish between personnel who were married and those who were living as married.

^bRefers to personnel stationed within the 48 contiguous States in the continental United States.

^cRefers to personnel stationed outside the continental United States or aboard afloat ships.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Need for Further Depression Evaluation, Q86-89; refer to Section 2.2 for descriptions of these sociodemographic variables).

Table 42. Behavior for Coping with Stress Among Personnel in Need of Further Depression Evaluation

Coping Behavior	Total DoD	
Talk to friend/family member	68.1	(1.1)
Light up a cigarette	38.5	(1.4)
Have a drink	41.7	(1.3)
Say a prayer	54.0	(1.4)
Exercise or play sports	50.0	(1.7)
Engage in a hobby	49.3	(1.1)
Get something to eat	53.6	(1.0)
Smoke marijuana/use illegal drugs	4.2	(0.7)
Think of plan to solve problem	82.2	(1.1)
Consider hurting or killing yourself	18.3	(1.0)

Note: Table entries are percentages (with standard errors in parentheses) of personnel who are considered in need for further depression evaluation ($N=2,585$) who "frequently" or "sometimes" engage in a behavior when they feel pressured, stressed, depressed, or anxious. The definition for need for further depression evaluation is given in Section 2.2.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Need for Further Depression Evaluation, Q86-89; Coping Behavior, Q91A-J).

8.5 Alcohol, Stress, and Mental Health

We also examined the relation of alcohol use during the past 30 days to perceived stress at work and in family life, to mental health, and to the need for further assessment for depression. We found that there was a relationship between alcohol use and the stress and mental health measures. The most notable differences occurred between abstainers and heavy drinkers. In particular, relative to abstainers, more heavy alcohol users

- perceived a great deal of stress at work (42.3% vs. 34.1%; data not shown in a table) or in their family life (27.4% vs. 20.0%),
- experienced 11 or more days during the month when their mental health was not good (15.8% vs. 9.9%), and
- met the criterion for needing further depression assessment (23.4% vs. 13.7%).

These findings are consistent with other national studies showing high rates of comorbidity (i.e, the simultaneous occurrence of two or more disorders in one person) between substance use and mental health problems, both in the general population of the United States (Regier et al., 1990) and among military veterans (Kulka et al., 1990). Although it is clear that there also is a relationship between heavy drinking and stress at work, the data do not allow us to infer the direction of the relationship. It seems more

likely, however, that alcohol would be used as a relatively ineffective avoidance strategy for coping with stress rather than as a precursor of stress. These findings suggest that the relationships among alcohol, stress, and mental health are in need of further assessment. In particular, it is important to understand the extent of these relationships, the risk factors that contribute to them, and the potential clinical, research, and policy actions that should be taken to address them.

8.6 Selected Mental Health Issues

We asked respondents several questions about mental health care. These included whether they had felt a need for counseling within the past 12 months and whether they had received such care. Personnel also were questioned about their perception of whether mental health counseling would detrimentally impact their career.

- About 17% to 18% of personnel in each Service indicated that they had perceived a personal need for counseling in the 12 months prior to the survey (data not shown in a table).
- Only about half (9.3% in the total DoD) of those who those who felt a need for counseling actually received care. Among those who did receive mental health care, the majority was provided by a military mental health professional (5.2% of the total force) or a military chaplain (4.2%).
- Almost 60% of the total DoD were uncertain about the impact of mental health counseling on a military career, with the remainder evenly divided between "definitely will" and "definitely will not" damage a military career. Some potentially significant Service differences emerged on this measure; Army personnel seemed more optimistic about the impact of counseling (17.7% for "definitely will" damage one's military career vs. 24.2% for "definitely will not") than those in the Air Force (23.1% "definitely will" vs. 13.9% "definitely will not"). In the Navy and Marine Corps, respondents were more equally divided as to whether counseling would damage a military career.

Thus, in 1998 only about half of military personnel who felt they needed counseling received it. The general ambiguity surrounding the potential career impact of mental health counseling is clear. It is quite possible that the fear of negative career consequences is preventing some Service members from seeking mental health counseling. Personnel who are in need of health services that they are reluctant to seek likely are not performing at their optimal level on the job. Therefore, the resolution of this conflict (perhaps through education and assurance of anonymity) could increase the readiness of the U.S. military forces.

8.7 Summary

In this chapter, we examined the mental health, stress, and coping behaviors of military personnel. We found that more stress was associated with work than with family life; overall, 38.2% of military personnel reported a "great deal" or "fairly large amount" of stress at work. The most frequently reported source of stress, by 19.5% of both women and men, was separation from family. These high levels of stress were associated with job performance, in that personnel with high levels of stress reported more productivity loss than those with lower levels of stress. To deal with the stress in their lives, military personnel were more likely to use productive approaches (i.e., problem-focused and approach-oriented) than less productive (i.e., avoidant) ones.

A depression screener included in the 1998 DoD survey revealed that 16.1% of the total DoD was in need of further evaluation for depression. Compared to personnel who did not show significant depressive symptoms, those in this group perceived higher levels of stress in work and family, reported more productivity loss, and were more likely to use less productive (avoidant) coping strategies. The most salient example of the differences in coping strategies was that 18.3% of those in need of further depression evaluation had considered hurting or killing themselves in response to stress compared to 1.3% of those who did not need further evaluation.

An examination of the relationships among alcohol use, stress, and mental health revealed some notable differences between abstainers and heavy drinkers. Compared to abstainers, more heavy alcohol users perceived a great deal of stress at work and in family life and experienced poor mental health.

Finally, we explored Service members' experiences with and opinions about mental health care. Although 17.6% of the total DoD personally had felt a need for mental health care, only 9.3% received care. This may be related to the fact that the majority of personnel were unsure whether seeking mental health care would negatively impact their military career.

In addition to the issues discussed in this chapter, the Military should consider the impact of other potential negative outcomes of stress and poor mental health on military functioning, including attrition, lower morale, and medical treatment costs for substance abuse, health, and mental health problems. Stress-related negative effects on any of these measures potentially compromise military readiness.

9. SPECIAL ISSUES IN THE MILITARY

In this chapter, we investigate several health issues that may affect the readiness of the force: (a) women's health issues, including stress associated with being a woman in the Military, cervical cancer risk reduction, and maternal and infant health; (b) testicular self-examination among men in the Military; (c) oral health; and (d) gambling in the Military, including the prevalence of problem gambling and the relation between problem gambling and alcohol use. The topics of oral health and testicular self examinations are new to the DoD series.

9.1 Gender-Specific Health Issues

9.1.1 Stress Serving as a Military Woman

As shown in Table 43, many women reported experiencing a "great deal" or a "fairly large amount of stress as women in the Military.

- About one-third (31.8%) of military women reported being under a "great deal" or a "fairly large amount" of stress related to being a woman in the Military. Marine Corps women reported the highest rate of stress (40.4%).
- In the total DoD, stress associated with being a woman in the Military was higher among women who were younger, less well-educated, married without a spouse present, and enlisted.

This stress may be related to work and family roles, as well as from being women in a predominantly male Military. These data suggest that stress management techniques that address issues of coping in a male environment should be broadly disseminated to military women.

9.1.2 Cervical Cancer Risk Reduction

Having regular Pap tests and seeking necessary treatment decreases the risk of cervical cancer. Receipt of Pap smears was nearly universal among military women:

- Some 97.8% of military women received a Pap smear in their lifetime, and 95.9% had the test within the past 3 years (data not shown in a table).
- Military women overall exceeded the *Healthy People 2000* objectives of 95% having ever had a Pap smear and 85% having had one in the past 3 years. In addition, women in each Service also exceeded these objectives (data not shown in a table).

Table 43. Stress Associated with Being a Woman in the Military, by Selected Sociodemographic Characteristics

Characteristic	Service									
	Army		Navy		Marine Corps		Air Force		Total DoD	
Race/Ethnicity										
Caucasian, non-Hispanic	35.4	(2.2)	28.8	(2.2)	40.4	(4.6)	26.9	(1.9)	30.3	(1.2)
African American, non-Hispanic	36.9	(3.2)	35.4	(2.7)	34.9	(6.4)	20.1	(4.5)	32.7	(2.2)
Hispanic	36.5	(5.3)	34.3	(4.8)	40.3	(6.0)	35.3	(4.3)	36.0	(2.7)
Other	35.5	(6.6)	37.9	(5.0)	+	(+)	28.6	(5.3)	32.9	(3.3)
Education										
High school or less	39.6	(4.1)	31.3	(3.7)	37.3	(4.9)	26.4	(3.7)	33.8	(2.1)
Some college	37.1	(1.9)	36.4	(2.4)	41.8	(3.6)	27.5	(1.9)	33.5	(1.2)
College graduate or higher	30.4	(3.1)	22.6	(1.7)	30.3	(6.0)	25.2	(2.3)	26.4	(1.5)
Age										
20 or younger	37.0	(4.0)	35.2	(7.4)	40.0	(6.3)	19.1	(4.9)	31.3	(2.7)
21-25	38.2	(2.3)	36.3	(3.9)	42.8	(3.4)	29.4	(3.2)	35.0	(1.7)
26-34	36.8	(3.1)	29.6	(3.1)	33.4	(4.6)	25.0	(2.8)	30.6	(1.8)
35 or older	31.5	(3.3)	25.7	(2.7)	32.4	(4.6)	28.7	(2.2)	29.0	(1.6)
Family Status ^a										
Not married	36.4	(2.1)	30.4	(2.7)	41.1	(4.2)	25.5	(2.1)	31.6	(1.3)
Married, spouse not present	37.1	(3.8)	42.4	(7.6)	34.8	(7.9)	+	(+)	39.8	(3.8)
Married, spouse present	35.5	(2.6)	31.9	(2.9)	34.6	(5.2)	26.3	(1.6)	30.9	(1.3)
Pay Grade										
Enlisted	37.9	(1.8)	34.1	(2.3)	40.0	(3.9)	27.4	(1.9)	33.4	(1.1)
Officer	27.8	(3.1)	20.8	(2.2)	24.5	(4.9)	23.7	(2.4)	24.4	(1.5)
Region										
CONUS ^b	34.9	(2.0)	29.9	(2.8)	38.1	(3.8)	25.9	(1.7)	30.7	(1.2)
OCONUS ^c	39.9	(3.3)	35.6	(2.7)	+	(+)	29.1	(3.7)	35.0	(1.8)
Total	36.1	(1.7)	31.4	(2.1)	38.5	(3.7)	26.7	(1.6)	31.8	(1.0)

Note: Table entries are percentages (with standard errors in parentheses) of women who indicated "a great deal" or "a fairly large amount" of stress associated with being a woman in the Military. Estimates have not been adjusted for sociodemographic differences among Services.

⁺Low precision.

^aEstimates by family status in 1998 are not strictly comparable to those from other survey years. In 1998, personnel who reported that they were living as married were classified in the "not married" group. In prior years, the marital status question did not distinguish between personnel who were married and those who were living as married.

^bRefers to personnel stationed within the 48 contiguous States in the continental United States.

^cRefers to personnel stationed outside the continental United States or aboard afloat ships.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Stress Associated With Being a Woman in the Military, Q136; refer to Section 2.2 for descriptions of sociodemographic variables).

9.1.3 Maternal and Infant Health

Research studies consistently show that adequate prenatal care is associated with decreased infant mortality rates and improved birth outcomes (Stringer, 1998). Use of substances during pregnancy, including tobacco and alcohol, has been linked to a variety of negative birth and developmental outcomes, such as prematurity, low birth weight, and congenital malformations (McGann & Spangler, 1997; National Institute on Drug Abuse, 1995; Visscher, Bray, & Kroutil, 1999).

9.1.3.1 Pregnancy. Understanding factors that promote health among pregnant military women is of interest because pregnancy and the health of female personnel affect military readiness.

- An estimated 16.0% of military women reported that they had been pregnant within the past year, and another 1.2% reported that they may have been pregnant at the time of the survey but that they were unsure.
- Service-level estimates of pregnancy within the past year ranged from 12.1% in the Air Force to 24.3% in the Marine Corps.
- Approximately 36% of military women had been pregnant within the past 5 years, although some of these pregnancies may have occurred prior to military service (data not shown in a table).

9.1.3.2 Use of Prenatal Care Services. As shown in Table 44, demographic characteristics were correlated with receipt of prenatal care.

- Personnel less likely to have received prenatal care in the first trimester were those with less than a college degree, those aged 20 or younger, those who were unmarried, and those women who were enlisted.

9.1.3.3 Alcohol and Cigarette Use During Pregnancy. A *Healthy People 2000* objective is to increase abstinence from alcohol use during pregnancy by at least 20%, as discussed in Chapter 3. That results in a target of $\geq 88\%$ of women who were pregnant during the past 5 years and who were abstaining from alcohol use during their most recent pregnancy.

- As shown in Table 45, some 85.8% of all military women who were pregnant in the past 5 years abstained from alcohol during their most recent pregnancy. Although any use during pregnancy is of concern, higher rates of use are of greater concern.
- An estimated 2.0% of military women drank several times a month or more during their most recent pregnancy. More frequent drinking during the most recent pregnancy was more common among Navy

Table 44. Receipt of Prenatal Care During Most Recent Pregnancy, Past 5 Years, by Selected Sociodemographic Characteristics

Characteristic	Trimester of First Prenatal Care Visit ^a		
	First	Second	Third or None
Service			
Army	82.1 (1.7)	7.3 (1.1)	10.6 (1.4)
Navy	85.7 (2.8)	5.8 (1.0)	8.6 (2.5)
Marine Corps	84.1 (2.4)	7.7 (2.0)	8.3 (1.3)
Air Force	87.9 (2.6)	3.9 (1.3)	8.2 (2.2)
Race/Ethnicity			
Caucasian, non-Hispanic	86.2 (1.7)	4.8 (0.9)	9.0 (1.5)
African American, non-Hispanic	83.4 (1.7)	7.5 (1.5)	9.0 (1.4)
Hispanic	84.5 (3.0)	5.4 (1.8)	10.2 (2.6)
Other	83.6 (4.5)	6.9 (2.2)	9.5 (4.0)
Education			
High school or less	85.5 (2.1)	5.5 (1.1)	9.1 (1.8)
Some college	81.9 (1.7)	7.2 (0.9)	11.0 (1.4)
College graduate or higher	93.9 (1.5)	2.4 (1.1)	3.6 (1.3)
Age			
20 or younger	79.2 (3.4)	8.3 (2.4)	12.5 (2.4)
21-25	82.2 (1.9)	6.3 (1.1)	11.5 (1.7)
26-34	87.8 (1.8)	5.2 (1.2)	7.0 (1.5)
35 or older	90.7 (2.6)	4.3 (1.9)	5.1 (1.7)
Family Status^b			
Not married	76.3 (2.0)	6.5 (1.1)	17.3 (2.0)
Married, spouse not present	89.1 (5.4)	4.7 (2.7)	+ (+)
Married, spouse present	90.7 (1.3)	5.6 (1.0)	3.7 (0.9)
Pay Grade			
Enlisted	83.7 (1.3)	6.5 (0.8)	9.8 (1.1)
Officer	93.4 (1.9)	1.4 (0.9)	5.2 (1.7)
Total	84.9 (1.2)	5.9 (0.7)	9.2 (1.1)

Note: Table entries are percentages (with standard errors in parentheses) of military women who were pregnant in the past 5 years (N=1,299). Estimates have not been adjusted for sociodemographic differences among Services.

+Low precision.

^aFirst trimester = months 1 to 3 of pregnancy; second trimester = months 4 to 6 of pregnancy; third trimester = month 7 or later.

^bEstimates by family status in 1998 are not strictly comparable to those from other survey years. In 1998, personnel who reported that they were living as married were classified in the "not married" group. In prior years, the marital status question did not distinguish between personnel who were married and those who were living as married.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Receipt of Prenatal Care During Most Recent Pregnancy, Past 5 Years, Q137 and 138; refer to Section 2.2 for descriptions of sociodemographic variables).

Table 45. Alcohol and Cigarette Use During Most Recent Pregnancy, Past 5 Years, by Service

		Service								
Substance/Amount		Army		Navy		Marine Corps		Air Force		Total
Alcohol Use										
None		87.8	(1.8)	81.9	(1.8)	86.9	(2.7)	85.9	(2.8)	85.8 (1.2)
Once a month or less ^a		10.8	(1.7)	14.8	(1.8)	11.6	(2.7)	12.1	(2.5)	12.2 (1.1)
More than once a month ^b		1.4	(0.6)	3.3	(1.1)	1.5	(0.8)	2.0	(0.7)	2.0 (0.4)
Cigarette Use										
None		86.1	(1.9)	85.8	(2.7)	79.6	(3.8)	86.8	(2.6)	85.8 (1.3)
Less than one pack ^c		12.9	(2.0)	11.5	(2.7)	17.0	(3.2)	11.5	(2.0)	12.4 (1.2)
One or more packs ^d		1.0	(0.5)	2.7	(1.0)	3.5	(1.5)	1.7	(0.9)	1.8 (0.4)

Note: Table entries are percentages of military women who were pregnant in the past 5 years (with standard errors in parentheses). Estimates were based on 1,299 women who were pregnant in the past 5 years. Estimates have not been adjusted for sociodemographic differences among Services.

^aDefined as alcohol use "once a month or less (but at least once)" during the most recent pregnancy.

^bDefined as alcohol use "several times a month (but less than once a week)," "1-2 days a week," "almost daily, or 3-6 days a week," or "daily" during the most recent pregnancy.

^cDefined as usually smoking "less than 1 cigarette, on the average," "1-5 cigarettes," or "about ½ pack, (6-15 cigarettes)" per day during the most recent pregnancy.

^dDefined as usually smoking "about 1 pack (16-25 cigarettes)," "about 1-1/2 packs (26 to 35 cigarettes)," or "about 2 or more packs (more than 35 cigarettes)" per day during the most recent pregnancy.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Alcohol Use and Cigarette Use During Most Recent Pregnancy, Past 5 Years, Q137, 139-140, 141-142; refer to Section 2.2 for descriptions of sociodemographic variables).

women, those aged 20 or younger, unmarried women, and those who received prenatal care only during the third trimester or not at all.

A related *Healthy People 2000* objective states that the proportion of women who do not smoke during pregnancy should be greater than or equal to 90%. Military women overall had not yet reached this objective in 1998.

- About 86% of military women who were pregnant during the past 5 years reported no cigarette use during their most recent pregnancy, about 12% reported some cigarette use, and approximately 2% reported heavy use (smoking a pack a day or more).

Thus, greater preventive efforts need to be directed at those military women who used alcohol or smoked cigarettes during their last pregnancy. These efforts could be coupled with efforts to increase the percentage of women who receive prenatal care early in their pregnancies.

9.1.4 Testicular Self-Examinations

For the first time in the DoD survey series, the survey questionnaire included a pair of questions addressing the topic of testicular self examinations among male personnel. The National Cancer Institute (NCI, 1999) indicated that men can improve their chances of finding a tumor by performing a testicular self-examination once a month. Table 46 shows the responses of male personnel to these questions:

- One-third (33.1%) of all military men examined their testicles for lumps once a month or more often during the past 12 months. Similarly, roughly one-third (34.2%) of all military men had never examined their testicles for lumps in the past 12 months. Air Force (41.6%) and Marine Corps (38.0%) men showed the highest percentages.
- Only about half (48%) of all military men had ever received information or instruction on how to examine their testicles for lumps.

Service- and DoD-level estimates taken together suggested a positive relationship between education and self-care behavior. Higher percentages of self-examination once a month or more were found for those Services in which greater percentages of men reported receiving education. Military health care providers should take a more proactive approach to inform their male patients of this simple self-check, as well as the benefits of early detection of suspicious lumps.

Table 46. Testicular Self-Examination Issues Among Military Men, by Service

Testicular Self-Examination Measure	Service				Total DoD
	Army	Navy	Marine Corps	Air Force	
Frequency of Examining Testicles, Past 12 Months					
Once a month or more often	38.4 (0.7)	36.0 (1.6)	31.9 (0.7)	24.4 (0.7)	33.1 (0.5)
Every other month	9.3 (0.5)	8.9 (0.4)	7.0 (0.5)	8.5 (0.5)	8.7 (0.2)
3-5 days	5.7 (0.4)	4.6 (0.3)	6.3 (0.5)	5.9 (0.4)	5.6 (0.2)
Once or twice	18.7 (0.7)	17.8 (0.8)	16.8 (0.8)	19.5 (0.7)	18.4 (0.4)
Never	27.9 (1.0)	32.7 (1.4)	38.0 (1.2)	41.6 (1.1)	34.2 (0.6)
Ever Received Education on Testicular Self-Examination					
	58.3 (2.4)	47.8 (1.8)	40.8 (2.1)	37.9 (1.9)	47.8 (1.1)

Note: Table entries are percentages (with standard errors in parentheses) of military men.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Testicular Self-Exam, Frequency, Q132; Education on Testicular Self-Exam, Q133).

9.2 Oral Health

Oral health and its relation to military readiness have become increasingly important in recent years. For the first time in the DoD survey series, respondents were asked a set of four questions pertaining to oral health issues. Table 47 provides information about the recency of dental check-ups, dental work prior to deployment, tooth loss, and reasons for not having a dental check-up:

- Approximately 90% of all military personnel had a dental check-up in the past 12 months, with few differences among the Services. Of all military personnel across the total DoD, 16% were required to get dental work done in the past 12 months before they could be deployed at sea or in the field.
- Approximately 16% of all personnel, since joining the Military, had lost a permanent tooth or teeth due to one or more of the following problems: gum disease, cavities, a mouth injury, or some other problem. Cavities were the cause most often responsible for tooth loss from among the four problems (8.6%).
- Of those personnel who did not have a dental check-up in the past 12 months, almost one-third (31.6%) did not do so because they would have had to wait too long at a military dental clinic before being seen (data not shown in a table). Nearly 31% of all personnel who did not have a dental check-up in the past 12 months failed to do so because they do not like going to any dentists (data not shown in a table).
- Across the total DoD, about one-quarter of those who did not have a dental check-up in the past 12 months did not do so for each of the following reasons: they could not get time off from work; they could not get an appointment with a military dentist; they could not afford to go to a civilian dentist; they did not think they needed a check-up; or they did not like going to the dentist at their installation (data not shown in a table).

To encourage better oral health care, military personnel in all the Services can be made more aware of the benefits of regular annual check-ups and of recent advances in modern dentistry, including better pain control during dental examinations and procedures.

9.3 Gambling in the Military

In recent years, there has been increasing interest and concern about pathological gambling in the Military. Problems related to excessive gambling can affect the financial and psychological well-being of military personnel and, thus, in turn, can have a negative effect on military readiness.

Table 47. Selected Oral Health Issues, Total DoD

Oral Health Measure	Service				Total DoD
	Army	Navy	Marine Corps	Air Force	
Had a Dental Check-Up, Past 12 Months	89.7 (0.6)	88.5 (1.3)	89.2 (0.7)	92.7 (1.7)	90.2 (0.6)
Required to Get Dental Work Before Deployment, Past 12 Months	22.9 (1.6)	12.3 (1.2)	20.3 (2.5)	9.1 (1.0)	16.0 (0.8)
Tooth Loss Since Joining Military					
Due to any problem	19.8 (0.7)	15.7 (1.0)	13.5 (0.6)	12.9 (0.6)	16.0 (0.4)
Due to gum disease	2.3 (0.3)	1.6 (0.2)	1.4 (0.3)	0.8 (0.1)	1.6 (0.1)
Due to dental cavities	12.1 (0.7)	7.5 (0.4)	6.4 (0.4)	6.3 (0.4)	8.6 (0.3)
Due to injury	3.9 (0.4)	3.2 (0.4)	3.4 (0.3)	1.6 (0.2)	3.0 (0.2)
Due to some other problem	6.4 (0.3)	6.4 (0.8)	4.4 (0.3)	5.7 (0.5)	5.9 (0.3)
Reasons for Not Having Dental Check-Up*					
Couldn't get time off from work	33.3 (2.7)	19.2 (3.1)	28.5 (3.2)	17.7 (2.6)	25.2 (1.9)
Couldn't get an appointment with a military dentist	33.7 (3.1)	23.1 (4.0)	36.0 (2.8)	26.9 (4.8)	29.4 (2.0)
Would have had to wait too long at a military dental clinic before being seen	36.7 (3.3)	28.7 (3.3)	35.4 (3.5)	24.4 (2.6)	31.6 (1.7)
Couldn't afford to go to a civilian dentist	23.9 (2.0)	24.5 (2.1)	26.9 (1.7)	21.4 (2.6)	24.0 (1.2)
Didn't think I needed a check-up	27.3 (1.4)	28.2 (2.5)	26.1 (1.3)	14.5 (2.9)	24.8 (1.1)
Don't like going to the dentist at this installation	29.4 (2.9)	28.3 (3.1)	20.2 (2.2)	27.9 (5.0)	27.5 (1.8)
Don't like going to any dentists	34.3 (2.1)	35.6 (3.1)	22.0 (2.3)	23.5 (2.3)	30.8 (1.4)

Note: Table entries are percentages (with standard errors in parentheses).

*Based on a sample size of 1,561 respondents who reported that they did not have a dental check-up in the past 12 months.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Dental Checkup Past 12 Months, Q108; Required Dental Work Prior to Deployment, Q110; Tooth Loss, Q111; Reasons for Not Having Check-Up, Q109A-G).

Only a limited number of studies have been conducted on the prevalence of pathological gambling in the general population. Many studies have used the South Oaks Gambling Screen (SOGS) of Lesieur and Blume (1987), a 20-item instrument designed to measure pathological gambling. Estimates of the combined lifetime prevalence of problem and probable pathological gambling based on the SOGS have ranged from 5.4% of the adult population in Texas to 1.7% of the adult population in Iowa (Volberg, 1992, 1994; Volberg & Silver, 1993; Volberg & Steadman, 1988, 1989a, 1989b; Volberg & Stuefen, 1991; Wallisch, 1996). The subset of respondents classified as probable pathological gamblers has ranged from 0.1% in Iowa to 1.8% in Texas (Volberg, 1992, 1994; Volberg & Silver, 1993; Volberg & Steadman, 1988, 1989a, 1989b; Volberg & Stuefen, 1991; Wallisch, 1996).

Studies conducted in three other States—Louisiana (Kroutil et al., 1997), Missouri (Kroutil et al., 1998), and Vermont (Bray et al., 1997) used the same set of questions as was used in the 1998 DoD survey, rather than the SOGS. Estimates of lifetime problem gambling ranged from 3.8% in Vermont to 5.1% in Louisiana. These estimates include those considered probable pathological gamblers. Examined separately, 0.7% of adults in Missouri, 0.8% of adults in Vermont, and 1.4% of adults in Louisiana were considered probable pathological gamblers.

Demographic correlates of problem gambling also have been investigated. Data from one SOGS study revealed that, compared with all respondents, problem or probable pathological gamblers were more likely to be male, under the age of 30, nonwhite, of lower income, and less likely to have graduated from high school (Volberg & Steadman, 1988). In Vermont, men were more likely than women to be probable pathological gamblers; among probable pathological gamblers, 1.3% were men and only 0.3% were women (Bray et al., 1997). Importantly, based on the demographic characteristics of problem and pathological gamblers that were observed in many States, the prevalence of problem or pathological gambling in the Military could potentially be higher than the prevalence in the general population by virtue of the demographic composition of the Military, with higher proportions of males, younger persons, and nonwhites in the Military relative to the general population.

9.3.1 Prevalence of Problem Gambling

Respondents in the 1998 DoD survey were asked a series of eight questions on problems related to gambling in order to assess the lifetime prevalence of gambling problems and the lifetime prevalence of probable pathological gambling in the Military. An affirmative answer to *at least one* of the eight items was considered to be indicative of *problem gambling* at some point in a person's life, but not necessarily pathological gambling. Answering affirmatively to *three or more* of the eight problem items was considered to indicate *probable pathological gambling* in the lifetime.

Responses of personnel to each of the eight items are shown in Table 48.

- For the total DoD, 8.1% of personnel had experienced at least one of the eight gambling-related problems in their lifetime, and 2.2% experienced at least three of these gambling-related problems, the level constituting probable pathological gambling. The Marine Corps (10.3%) showed the highest rate of at least one gambling problem.
- The prevalence of individual gambling problems for the total DoD did not change greatly since 1992. Increased preoccupation with gambling and going back to win money lost were behaviors most frequently reported in both the 1992 and 1998 surveys.
- The prevalence of three or more problems (about 2%), an indication of probable pathological gambling, was virtually unchanged between 1992 and 1998. Similarly, the percentage of those who reported at least one gambling problem was about the same in 1992 (7.1%) and 1998 (8.1%).

Although the lifetime prevalence of probable pathological gambling (2.2%) in the Military was relatively low, this rate was slightly higher than the rates that researchers observed using the SOGS instrument among civilian populations (0.1% to 1.8%) (Volberg, 1992, 1994; Volberg & Silver, 1993; Volberg & Steadman, 1988, 1989a, 1989b; Volberg & Stuefen, 1991; Wallisch, 1996). Rates among the Military also were higher than those observed in Missouri (Kroutil et al., 1998), Vermont (Bray et al., 1997), and Louisiana (Kroutil et al., 1997), States where the same instrument was used and the data therefore are more comparable. These higher rates among Military personnel may be due to the demographic composition of the Military, as mentioned earlier. These results should not be considered to be a conclusive indication that the prevalence of pathological gambling is higher in the Military than among civilians. Further study of pathological gambling, both in the Military and among civilians, would be needed before such a conclusion could be reached.

9.3.2 Problem Gambling and Alcohol Use

Investigation of the co-occurrence of gambling and alcohol use is important in the examination of gambling problems in that research has identified an association between these two addictive behaviors. A study of adults in St. Louis found that problem gamblers were more likely than nongamblers to use alcohol and abuse or be dependent on alcohol (Cunningham-Williams, Cottler, Compton, & Spitznagel, 1998). Studies of adults in treatment also have found similar associations. Lessieur, Blume, and Zoppa (1986) reported that 5% of patients in an alcohol and drug abuse treatment center who only abused alcohol were pathological gamblers.

Table 48. Lifetime Prevalence of Gambling Problems in 1998 and 1992

Problem	1998					1992
	Service				Total DoD	Total DoD
	Army	Navy	Marine Corps	Air Force	Total DoD	Total DoD
Increased preoccupation with gambling	4.2 (0.5)	3.1 (0.3)	5.3 (0.5)	3.8 (0.3)	3.9 (0.2)	4.1 (0.4)
Needed to gamble with increased amounts of money to achieve desired level of excitement	2.3 (0.3)	1.3 (0.2)	3.2 (0.3)	1.7 (0.2)	2.0 (0.1)	2.1 (0.2)
Restless or irritable when unable to gamble	1.7 (0.3)	1.0 (0.2)	1.8 (0.2)	1.1 (0.2)	1.3 (0.1)	1.4 (0.1)
Gambled to escape from problems	1.2 (0.2)	1.1 (0.2)	1.4 (0.3)	1.0 (0.2)	1.1 (0.1)	1.2 (0.2)
Went back to try to win back money lost	5.6 (0.4)	5.4 (0.6)	8.2 (0.4)	6.5 (0.5)	6.1 (0.3)	5.3 (0.3)
Lied to others about extent of gambling	1.2 (0.2)	1.5 (0.2)	2.1 (0.3)	1.3 (0.3)	1.4 (0.1)	1.1 (0.1)
Jeopardized or lost important relationships, job, or career opportunities because of gambling	0.7 (0.2)	0.4 (0.2)	1.1 (0.2)	0.4 (0.1)	0.6 (0.1)	0.4 (0.1)
Someone provided money to relieve financial problems caused by gambling	0.8 (0.2)	0.6 (0.2)	1.2 (0.2)	0.6 (0.1)	0.8 (0.1)	0.7 (0.1)
1 or more problems	8.0 (0.5)	7.3 (0.7)	10.3 (0.6)	8.2 (0.5)	8.1 (0.3)	7.1 (0.4)
3 or more problems^a	2.3 (0.3)	1.5 (0.2)	3.3 (0.4)	2.0 (0.3)	2.2 (0.1)	2.0 (0.2)

Note: Table entries are percentages (with standard errors in parentheses). Estimates have not been adjusted for sociodemographic differences among Services.

^aIndication of three or more problems was interpreted to suggest probable pathological gambling.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1992 and 1998 (1998 Questions: Gambling Problems, Q122A-H).

Table 49 shows the relationship between problem gambling and alcohol use:

- Gambling problems were related to alcohol use. An estimated 15.2% of heavy drinkers had at least one problem associated with gambling in their lifetime compared to 4.9% of abstainers and 8.1% of military personnel overall, regardless of drinking level.
- About one in five (20.4%) personnel who showed symptoms of alcohol dependence also had at least one gambling-related problem, and 8.8% could be classified as probable pathological gamblers.
- About 13% of those who had been treated for alcohol problems since joining the Military had at least one gambling-related problem, and 3.9% could be classified as probable pathological gamblers.

9.4 Summary

This chapter presented data on a range of health issues of special interest to the Military. Findings indicate that for some health behaviors, military personnel are meeting set objectives. Specifically, cervical cancer screening was nearly universal among military women and exceeded *Healthy People 2000* goals. The data also suggest, however, areas that will require further attention in coming years, especially stress levels experienced by military women because of their gender. Stress management techniques that address issues of coping in a male environment could be broadly disseminated to military women. Increased health education efforts need to be targeted at reducing alcohol and tobacco use during pregnancy among women and building awareness of the necessity for testicular self-examinations in men. The problem of long waits at military dental clinics at some installations should be addressed and rectified so that more personnel make and keep appointments for preventive dental care. In addition, overall rates of problem and probable pathological gambling highlight a subset of Military personnel at risk and identify another area worthy of further attention. Finally, the relationship between heavy alcohol use and gambling problems suggests that those undergoing care for alcohol problems also should be screened for gambling problems.

Table 49. Alcohol Use and Gambling Problems, Total DoD

Alcohol Measure	Number of Gambling Problems			
	0	1	2	3 or More ^a
Drinking Level				
Abstainer	95.1 (0.4)	2.8 (0.3)	1.0 (0.2)	1.1 (0.2)
Infrequent/light or moderate	93.1 (0.5)	3.9 (0.4)	1.1 (0.2)	1.8 (0.2)
Moderate/heavy	91.2 (0.6)	5.1 (0.4)	1.5 (0.3)	2.2 (0.3)
Heavy	84.8 (0.8)	7.5 (0.7)	3.2 (0.4)	4.5 (0.5)
Negative Effects				
Serious consequences	82.4 (1.5)	7.3 (1.2)	3.2 (0.7)	7.1 (0.9)
Productivity loss	82.8 (1.2)	8.4 (1.0)	3.0 (0.5)	5.8 (0.7)
Dependence symptoms	79.6 (1.7)	9.0 (1.6)	2.6 (0.8)	8.8 (1.1)
Alcohol Treatment Since Entering Service				
Yes	86.8 (1.4)	6.3 (0.9)	3.1 (0.7)	3.9 (0.7)
No	91.6 (0.5)	4.4 (0.4)	1.5 (0.2)	2.5 (0.3)

Note: Table entries are row percentages (with standard errors in parentheses). Estimates may not sum to 100 due to rounding.

^aIndication of three or more problems was interpreted to suggest probable pathological gambling.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Gambling Problems, Q122A-H; Drinking Level, Q15-18 and 20-23; Negative Effects: Serious Consequence, Q34 and 36, Productivity Loss, Q32A-F, Dependence Symptoms, Q33A-C and E-F; Alcohol Treatment, Q41).

REFERENCES

- American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: Author.
- Bray, R.M., Camlin, C.S., Kroutil, L.A., Rounds-Bryant, J.L., Bonito, A.J., & Apao, W. (1997). *Use of alcohol and illicit drugs and need for treatment among the Vermont household population: 1995* (prepared for Vermont Office of Alcohol and Drug Abuse Programs under Contract No. CSAT 270-94-0022/RTI/6141-010). Rockville, MD: Center for Substance Abuse Treatment.
- Bray, R.M., Guess, L.L., Mason, R.E., Hubbard, R.L., Smith, D.G., Marsden, M.E., & Rachal, J.V. (1983). *1982 Worldwide Survey of Alcohol and Non-medical Drug Use Among Military Personnel* (RTI/2317/01-01F). Research Triangle Park, NC: Research Triangle Institute.
- Bray, R.M., Kroutil, L.A., Luckey, J.W., Wheelless, S.C., Iannacchione, V.G., Anderson, D.W., Marsden, M.E., & Duntelman, G.H. (1992). *1992 Worldwide Survey of Substance Abuse and Health Behaviors Among Military Personnel*. Research Triangle Park, NC: Research Triangle Institute.
- Bray, R.M., Kroutil, L.A., Wheelless, S.C., Marsden, M.E., Bailey, S.L., Fairbank, J.A., & Harford, T.C. (1995). *1995 Department of Defense Survey of Health Related Behaviors Among Military Personnel* (RTI/6019-6). Research Triangle Park, NC: Research Triangle Institute.
- Bray, R.M., Marsden, M.E., Guess, L.L., Wheelless, S.C., Pate, D.K., Duntelman, G.H., & Iannacchione, V.G. (1986). *1985 Worldwide Survey of Alcohol and Nonmedical Drug Use Among Military Personnel*. Research Triangle Park, NC: Research Triangle Institute.
- Bray, R.M., Marsden, M.E., Guess, L.L., Wheelless, S.C., Iannacchione, V.G., & Keesling, S.R. (1988). *1988 Worldwide Survey of Substance Abuse and Health Behaviors Among Military Personnel*. Research Triangle Park, NC: Research Triangle Institute.
- Bray, R.M., Sanchez, R.P., Ornstein, M.L., Lentine, D., Vincus, A.A., Baird, T.U., Walker, J.A., Wheelless, S.C., Guess, L.L., Kroutil, L.A., & Iannacchione, V.G. (1999). *1998 Department of Defense Survey of Health Related Behaviors Among Military Personnel* (RTI/7034/006-FR). Research Triangle Park, NC: Research Triangle Institute.
- Brownell, K.D., & Fairburn, D.G. (Eds.). (1995). *Eating disorders and obesity: A comprehensive handbook*. New York: Guilford Press.
- Burt, M.A., Biegel, M.M., Carnes, Y., & Farley, E.C. (1980). *Worldwide Survey of Non-medical Drug Use and Alcohol Use Among Military Personnel: 1980*. Bethesda, MD: Burt Associates, Inc.
- Centers for Disease Control. (1988). Condoms for prevention of sexually transmitted diseases. *Morbidity and Mortality Weekly Report*, 37(9), 133-137.

- Centers for Disease Control and Prevention. (1997a, December 26). Cigarette smoking among adults—United States, 1995. *Morbidity and Mortality Weekly Report*, 46, 1217-1220.
- Centers for Disease Control and Prevention. (1997b, October 10). Mortality patterns—Preliminary data, United States, 1996. *Morbidity and Mortality Weekly Report*, 46, 941-944.
- Cunningham-Williams, R.M., Cottler, L.B., Compton, W.M., III, & Spitznagel, E.L. (1998). Taking chances: Problem gamblers and mental health disorders—Results from the St. Louis Epidemiologic Catchment Area Study. *American Journal of Public Health*, 88, 1093-1096.
- Department of Defense. (1980a, August 25). Directive No. 1010.4. *Alcohol and drug abuse by DoD personnel* (canceled by revised Directive 1010.4 on September 3, 1994; see DoD, 1997). Washington, DC: Deputy Secretary of Defense.
- Department of Defense. (1980b, December 5). Instruction No. 1010.5. *Education and training in alcohol and drug abuse prevention*. Washington, DC: Author.
- Department of Defense. (1985a, March 13). Instruction No. 1010.6. *Rehabilitation and referral services for alcohol and drug abusers*. Washington, DC: Author.
- Department of Defense. (1985b, September 23). Directive No. 1010.3. *Drug and alcohol abuse reports* (canceled by revised Directive 1010.4 on September 3, 1994; see DoD, 1997). Washington, DC: Author.
- Department of Defense. (1986). *Smoking and health in the military*. Washington, DC: Author.
- Department of Defense. (1994, March 7). Instruction No. 1010.15. *Smoke-free workplace* (for full on-line text, see <http://web7.whs.osd.mil/text/i101015p.txt>). Washington, DC: Author.
- Department of Defense. (1995, August 30). Instruction No. 1308.1. *DoD physical fitness and body fat programs procedures* (for full on-line text, see <http://web7.whs.osd.mil/text/i13083p.txt>). Washington, DC: Author.
- Department of Defense. (1997, September 3). Directive No. 1010.4. *Alcohol and drug abuse by DoD personnel* (supersedes and cancels August 25, 1980, version of Directive No. 1010.4 and September 23, 1985, version of Directive No. 1010.3; for full on-line text, see <http://web7.whs.osd.mil/text/d10104p.txt>). Washington, DC: Deputy Secretary of Defense.
- Department of Health and Human Services. (1996). *Physical activity and health: A report of the Surgeon General* (S/N 017-023-00196-5). Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion.
- Department of Health and Human Services. (1998, October 7). AIDS falls from top ten causes of death; teen births, infant mortality, homicide all decline (*HHS News*) [On-line]. Available: <http://www.cdc.gov/nchswwww/releases/98news/98news/aidsmort.htm> [Access date: 1998, December 29].

- Fleming, D.T., McQuillan, G.M., Johnson, R.E., Nahmias, A.J., Aral, S.O., Lee, F.K., & St. Louis, M.E. (1997). Herpes simplex virus type 2 in the United States, 1976 to 1994. *New England Journal of Medicine*, 337, 1105-1111.
- Foa, E.B., Steketee, G., & Olasov Rothbaum, B. (1989). Behavioral/cognitive conceptualizations of post-traumatic stress disorder. *Behavior Therapy*, 20, 155-176.
- Folkman, S., & Lazarus, R.S. (1980). An analysis of coping in a middle-aged community sample. *Journal of Health and Social Behavior*, 21, 219-239.
- Folkman, S., & Lazarus, R.S. (1985). If it changes it must be a process: Study of emotion and coping during three stages of a college examination. *Journal of Personality and Social Psychology*, 48, 150-170.
- Harrison, L., Brennan, M., & Shilanskis, C.M. (1998, September). *Physical activity patterns and satisfaction with fitness facilities among military members and their families* (MFI Technical Report 98-3). Scranton, PA: Marywood University, Military Family Institute.
- Horgan, C., Marsden, M.E., & Larson, M.J. (1993, October). *Substance abuse: The nation's number one health problem: Key indicators for policy* (prepared for the Robert Wood Johnson Foundation). Waltham, MA: Brandeis University, Heller Graduate School, Institute for Health Policy.
- Johnsen, B.H., Laberg, J.C., & Eid, J. (1998). Coping strategies and mental health problems in a military unit. *Military Medicine*, 163, 599-602.
- Jones, B.H., & Hansen, B.C. (Eds.). (1996, November). *Injuries in the military: A hidden epidemic* (prepared for the Armed Forces Epidemiologic Board by the Injury Prevention and Control Work Group, with contributions from the DoD Injury Surveillance and Prevention Work Group; Report No. 29 HA 4844 97). Falls Church, VA: Armed Forces Epidemiologic Board.
- Kalton, G. (1968). Standardization: A technique to control for extraneous variables. *Applied Statistics*, 23, 118-136.
- Kanki, B.G. (1996). Stress and aircrew performance: A team-level perspective. In J.E. Driskell & E. Salas (Eds.), *Stress and human performance* (pp. 127-162). Mahwah, NJ: Lawrence Erlbaum Associates.
- Kannel, W.B. (1993). Hypertension as a risk factor for cardiac events: Epidemiologic results of long-term studies. *Journal of Cardiovascular Pharmacology*, 21(Suppl. 2), S27-S37.
- Kroutil, L.A., Federman, E.B., Akin, D.R., Rounds-Bryant, J.L., Rachal, J.V., Becnel, J.M., & Simmons, D.A. (1997, December). *Use of alcohol and illicit drugs and need for treatment among Louisiana adult household residents: 1996* (final report prepared for the Louisiana Department of Health and Hospitals, Office of Alcohol and Drug Abuse, under Contract No. CSAT 94-0022; RTI/6142-01). Rockville, MD: Center for Substance Abuse Treatment.

- Kroutil, L.A., Guess, L.L., Condelli, W.S., Bonito, A.J., Akin, D.R., Walker, J.A., & Bray, R.M. (1998, April). *Substance use and need for treatment among the Missouri adult household population: 1997* (final report prepared for the Missouri Department of Mental Health, Division of Alcohol and Drug Abuse, under Contract No. CSAT 270-95-0031; RTI/6490-10). Rockville, MD: Center for Substance Abuse Treatment.
- Kulka, R.A., Schlenger, W.E., Fairbank, J.A., Hough, R.L., Jordan, B.K., Marmar, C.R., & Weiss, D.S. (1990). *Trauma and the Vietnam War generation*. New York: Brunner/Mazel.
- Lazarus, R.S. (1966). *Psychological stress and the coping process*. New York: McGraw-Hill.
- Lesieur, H.R., & Blume, S.B. (1987). The South Oaks Gambling Screen (SOGS): A new instrument for the identification of pathological gamblers. *American Journal of Psychiatry*, 144, 1184-1188.
- Lesieur, H.R., Blume, S.B., & Zoppa, R.M. (1986). Alcoholism, drug abuse and gambling. *Alcoholism: Clinical and Experimental Research*, 10, 33-38.
- Lusky, A., Barell, V., Lubin, F., Kaplan, G., Layani, V., Shohat, Z., Lev, B., & Wiener, M. (1996). Relationship between morbidity and extreme values of body mass index in adolescents. *International Journal of Epidemiology*, 25, 829-834.
- McGann, K.P., & Spangler, J.G. (1997). Alcohol, tobacco and illicit drug use among women. *Primary Care: Clinics in Office Practice*, 24(1), 113-122.
- Moos, R., & Billings, A. (1982). Conceptualizing and measuring coping resources and processes. In L. Goldberger & S. Breznitz (Eds.), *Handbook of stress: Theoretical and clinical aspects* (pp. 212-230). New York: Macmillan.
- National Cancer Institute. (1999). *What you need to know about testicular cancer* (updated 9/28/98) [On-line]. Available: <http://cancernet.nci.nih.gov/wyntk pubs/testic.htm> [Access date: 1999, March 4].
- National Cholesterol Education Program. (1994). Second report of the expert panel on detection, evaluation, and treatment of high blood cholesterol in adults (Adult Treatment Panel II). *Circulation*, 89, 1333-1345.
- National Heart, Lung, and Blood Institute. (1998, June). *Clinical guidelines on the identification, evaluation, and treatment of overweight and obesity in adults* [On-line]. Available: http://www.nhlbi.nih.gov/nhlbi/cardio/obes/prof/guidelns/ob_home.htm [Access date: 1999, January 5].
- National Highway Traffic Safety Administration. (1996, February). *Benefits of safety belts and motorcycle helmets: Report to Congress based on data from the Crash Outcome Data Evaluation System (CODES)* (DOT-HS-808-347) [On-line]. Available: <http://www.nhtsa.dot.gov/people/ncsa/reports.html>. [Access date: 1999, January 6].
- National Highway Traffic Safety Administration. (1997). *Traffic safety facts 1997* [On-line]. Available: <http://www.nhtsa.dot.gov/people/ncsa/Overvu97.html>. [Access date: 1999, January 6].

- National Institute on Drug Abuse (Bray, R.M., Visscher, W.A., Kroutil, L.A., Ardini, M.A., & Thornberry, J.P.). (1995). *Prevalence of drug use among DC women delivering livebirths in DC hospitals: 1992* (Technical Report #7 of Washington, DC, Metropolitan Area Drug Study). Rockville, MD: National Institute on Drug Abuse.
- Office of Applied Studies. (in press). *National Household Survey on Drug Abuse: Main findings 1997*. Rockville, MD: Substance Abuse and Mental Health Services Administration.
- Office of Applied Studies. (1998a, April). *National Household Survey on Drug Abuse: Main findings 1996* (DHHS Publication No. SMA 98-3200). Rockville, MD: Substance Abuse and Mental Health Services Administration.
- Office of Applied Studies. (1998b, July). *National Household Survey on Drug Abuse: Population estimates 1997* (DHHS Publication No. SMA 98-3250). Rockville, MD: Substance Abuse and Mental Health Services Administration.
- Office on Smoking and Health. (1989). *Reducing the health consequences of smoking: 25 years of progress: A report of the Surgeon General* (DHHS Publication No. CDC 89-8411). Washington, DC: U.S. Department of Health and Human Services.
- Orasanu, J.M., & Backer, P. (1996). Stress and military performance. In J.E. Driskell & E. Salas (Eds.), *Stress and human performance* (pp. 89-125). Mahwah, NJ: Lawrence Erlbaum Associates.
- Paffenbarger, R.S., Hyde, R.T., Wing, A.L., & Hsieh, C.C. (1986) Physical activity, all-cause mortality, and longevity of college alumni. *New England Journal of Medicine*, 314, 253-287.
- Piani, A.L., & Schoenborn, C.A. (1993). *Health promotion and disease prevention: United States, 1990* (Vital and Health Statistics, Series 10: Data from the National Health Survey, No. 185; DHHS Publication No. PHS 93-1513). Hyattsville, MD: National Center for Health Statistics.
- Polich, J.M., & Orvis, B.R. (1979). *Alcohol problems: Patterns and prevalence in the U.S. Air Force*. Santa Monica, CA: Rand Corporation.
- Public Health Service. (1991). *Healthy people 2000: National health promotion and disease prevention objectives—full report, with commentary* (DHHS Publication No. PHS 91-50212). Washington, DC: U.S. Department of Health and Human Services.
- Regier, D.A., Farmer, M.E., Rae, D.S., Locke, B.Z., Keith, S.J., Judd, L.L., & Goodwin, F.K. (1990). Comorbidity of mental disorders with alcohol and other drug abuse: Results from the Epidemiologic Catchment Area (ECA) study. *Journal of the American Medical Association*, 264, 2511-2518.
- Rost, K., Burnam, M.A., & Smith, G.R. (1993). Development of screeners for depressive disorders and substance disorder history. *Medical Care*, 31, 189-200.
- Sacks, J.J., Holmgreen, P., Smith, S.M., & Sosin, D.M. (1991). Bicycle-associated head injuries in the United States from 1984 through 1988. How many are preventable? *Journal of the American Medical Association*, 266, 3016-3018.

- Siegel, P.Z., Brackbill, R.M., Frazier, E.L., Mariolis, P., Sanderson, L.M., & Waller, M.N. (1991). Behavioral risk factor surveillance, 1986-1990 (In *CDC Surveillance Summaries*, December 1991). *Morbidity and Mortality Weekly Report*, 40(SS-4), 1-23.
- Siscovick, D.S., LaPorte, R.E., & Newman, J.M. (1985). The disease-specific benefits and risks of physical activity and exercise. *Public Health Reports*, 100, 180-188.
- Sosin, D.M., Sacks, J.J., & Holmgreen, P. (1990). Head injury-associated deaths from motorcycle crashes. *Journal of the American Medical Association*, 264, 2395-2399.
- Stringer, M. (1998). Issues in determining and measuring adequacy of prenatal care. *Journal of Perinatology*, 18(1), 68-73.
- Thompson, R.S., Rivara, F.P., & Thompson, D.C. (1989). A case-control study of the effectiveness of bicycle safety helmets. *New England Journal of Medicine*, 320, 1361-1367.
- Visscher, W.A., Bray, R.M., & Kroutil, L.A. (1999). Drug use and pregnancy. In R.M. Bray & M.E. Marsden (Eds.), *Drug use in metropolitan America* (pp. 235-265). Thousand Oaks, CA: Sage Publications.
- Volberg, R.A. (1992, September 31). *Gambling involvement and problem gambling in Montana*. Helena, MT: Montana Department of Corrections and Human Services.
- Volberg, R.A. (1994). The prevalence and demographics of pathological gamblers: Implications for public health. *American Journal of Public Health*, 84, 237-241.
- Volberg, R.A., & Silver, E. (1993, March 23). *Gambling and problem gambling in North Dakota*. Bismarck, ND: North Dakota Department of Human Services, Division of Mental Health.
- Volberg, R.A., & Steadman, H.J. (1988). Refining prevalence estimates of pathological gambling. *American Journal of Psychiatry*, 145, 502-505.
- Volberg, R.A., & Steadman, H.J. (1989a). Prevalence estimates of pathological gambling in New Jersey and Maryland. *American Journal of Psychiatry*, 146, 1618-1619.
- Volberg, R.A., & Steadman, H.J. (1989b). *Problem gambling in Iowa*. Delmar, NY: Policy Research Associates.
- Volberg, R.A., & Stuefen, R.M. (1991). *Gambling and problem gambling in South Dakota*. Delmar, NY: Policy Research Associates.
- Wallisch, L.S. (1996, August). *Gambling in Texas: 1995 Surveys of Adult and Adolescent Gambling Behavior*. Austin, TX: Texas Commission on Alcohol and Drug Abuse.

APPENDIX A
SUPPLEMENTAL TABLES

Table A.1 Substance Use Summary for the Army, 1980-1998

Measure	Year of Survey						
	1980	1982	1985	1988	1992	1995	1998
Alcohol Drinking Level							
Abstainer	15.5 (0.7)	11.7 (0.5) ^b	14.6 (0.7) ^b	17.0 (0.7) ^b	21.4 (1.4) ^b	20.6 (1.0)	23.1 (1.3) ^c
Infrequent/light	12.2 (0.9)	16.7 (1.0) ^b	16.4 (1.1)	16.8 (0.9)	17.2 (0.6)	18.0 (1.4)	18.8 (1.0) ^c
Moderate	19.9 (1.2)	16.6 (0.8) ^b	17.8 (0.7)	19.5 (0.7)	17.3 (0.8) ^b	18.0 (1.0)	16.9 (0.7) ^c
Moderate/heavy	32.0 (0.7)	30.3 (1.0)	25.7 (1.8) ^b	27.1 (0.8)	26.5 (1.4)	25.0 (1.1)	24.0 (0.8) ^c
Heavy	20.3 (1.6)	24.7 (1.4) ^b	25.5 (2.2)	19.7 (1.2) ^b	17.7 (1.6)	18.4 (1.8)	17.2 (1.6)
Any Illicit Drug Use^a							
Past 30 days	30.7 (2.8)	26.2 (1.8)	11.5 (1.3) ^b	6.9 (0.7) ^b	3.9 (0.8) ^b	4.0 (0.9)	4.5 (0.8)
Past 12 months	39.4 (2.9)	32.4 (1.8) ^b	16.6 (1.3) ^b	11.8 (1.1) ^b	7.7 (0.8) ^b	9.2 (1.1)	9.8 (0.9)
Cigarette Use, Past 30 Days							
Any smoking	54.3 (0.7)	54.7 (1.8)	52.0 (1.8)	43.1 (1.1)	37.0 (2.0) ^b	34.1 (1.6)	31.1 (1.2) ^c
Heavy smoking	35.2 (0.7)	34.6 (1.4)	33.6 (1.4)	22.8 (0.7) ^b	18.0 (1.1) ^b	17.0 (1.0)	14.1 (0.8) ^{b,c}
Alcohol Use Negative Effects							
Serious consequences	17.9 (1.6)	16.3 (1.2)	13.5 (2.0)	10.3 (0.8)	8.0 (1.1) ^d	7.9 (0.9)	8.5 (0.9) ^c
Productivity loss	23.8 (1.3)	33.1 (0.8) ^b	27.2 (1.3) ^b	22.0 (1.0) ^b	14.8 (1.4) ^b	16.5 (1.5)	13.4 (0.7) ^{b,c}
Dependence	8.8 (1.0)	10.1 (0.8)	12.1 (1.5)	7.2 (0.6) ^b	5.4 (0.7)	6.4 (0.9)	6.2 (0.5) ^c

Note: Table entries are percentages (with standard errors in parentheses). Definitions and measures of substance use are given in Section 2.2. The algorithm for computing drinking levels was altered for this report as follows: Estimates for drinking levels for 1998 take into account both 32-ounce or liter and 40-ounce size containers. Estimates for drinking levels for 1985 to 1995 take into account 32-ounce or liter containers, but not 40-ounce containers.

Therefore, 1985 to 1995 drinking-level estimates differ slightly from those reported in previous DoD survey reports. Tables A.5 through A.9 compare drinking-level estimates for 1985 to 1998 based on the algorithm used in previous reports and the algorithm used in this report.

^aAny nonmedical use of marijuana, PCP, LSD/hallucinogens, cocaine, amphetamines/stimulants, tranquilizers, barbiturates/sedatives, heroin/other opiates, analgesics, or inhalants. "Designer" drugs also are included for 1988, 1992, 1995, and 1998.

^bComparisons between this survey and the preceding survey are statistically significant at the 95% confidence level.

^cComparisons between 1980 and 1998 are statistically significant at the 95% confidence level.

^dThis estimate was incorrectly reported as 8.3 (1.2) in the 1995 report.

Source: DoD Surveys of Health Related Behaviors Among Military Personnel, 1980-1998 (1998 Questions: Alcohol Drinking Level, Q15-18 and 20-23; Any Illicit Drug Use: Past 30 Days, Q60 and 67, Past 12 Months, Q60-61 and 67; Cigarette Use, Past 30 Days: Any Smoking, Q44 and 47, Heavy Smoking, Q45; Alcohol Use Negative Effects: Serious Consequences, Q34 and 36, Productivity Loss, Q32A-F, Dependence, Q33A-C and E-F).

Table A.2 Substance Use Summary for the Navy, 1980-1998

Measure	Year of Survey						
	1980	1982	1985	1988	1992	1995	1998
Alcohol Drinking Level							
Abstainer	10.0 (0.5)	10.5 (1.4)	9.6 (0.8)	15.7 (0.6) ^b	19.6 (1.9)	19.0 (0.9)	24.1 (1.0) ^{b,c}
Infrequent/light	11.7 (0.6)	20.7 (2.3) ^b	18.8 (2.0)	18.2 (0.9)	18.6 (0.9)	18.7 (1.1)	19.3 (0.9) ^c
Moderate	20.5 (1.3)	15.1 (1.1) ^b	18.7 (1.0) ^b	20.7 (1.2)	20.2 (1.2)	19.2 (0.9)	18.8 (1.2)
Moderate/heavy	32.2 (1.6)	26.1 (1.5) ^b	27.9 (1.4)	30.7 (1.5)	27.4 (0.7) ^b	24.0 (1.6)	24.3 (1.0) ^c
Heavy	25.6 (2.3)	27.7 (2.9)	25.0 (1.4)	14.7 (2.0) ^b	14.2 (1.7)	19.1 (1.5) ^b	13.5 (1.8) ^{b,c}
Any Illicit Drug Use ^a							
Past 30 days	33.7 (2.1)	16.2 (2.2) ^b	10.3 (1.7) ^b	5.4 (0.7) ^b	4.0 (0.9)	3.6 (0.6)	1.8 (0.3) ^{b,c}
Past 12 months	43.2 (2.1)	28.1 (1.7) ^b	15.9 (2.3) ^b	11.3 (2.1)	6.6 (1.9)	7.3 (0.8)	4.2 (0.5) ^{b,c}
Cigarette Use, Past 30 Days							
Any smoking	53.8 (1.2)	55.4 (1.0)	47.9 (1.2) ^b	43.8 (1.8)	37.1 (1.7) ^b	34.9 (1.6)	30.6 (1.5) ^c
Heavy smoking	37.3 (1.3)	35.7 (1.4)	34.8 (1.6)	24.6 (2.0) ^b	20.4 (0.5) ^b	16.3 (1.4) ^b	14.8 (1.1) ^c
Alcohol Use Negative Effects							
Serious consequences	22.1 (2.1)	17.6 (1.4)	13.5 (2.0)	10.4 (1.5)	8.4 (3.2) ^d	8.6 (0.9)	4.8 (0.6) ^{b,c}
Productivity loss	34.7 (2.1)	41.8 (1.8) ^b	35.5 (2.4) ^b	26.4 (3.1) ^b	20.1 (4.1)	20.1 (1.9)	14.1 (1.5) ^{b,c}
Dependence	9.7 (1.0)	11.6 (1.0)	6.8 (0.8) ^b	7.2 (1.3)	5.2 (1.0)	6.1 (0.8)	3.3 (0.5) ^{b,c}

Note: Table entries are percentages (with standard errors in parentheses). Definitions and measures of substance use are given in Section 2.2. The algorithm for computing drinking levels was altered for this report as follows: Estimates for drinking levels for 1998 take into account both 32-ounce or liter and 40-ounce size containers. Estimates for drinking levels for 1985 to 1995 take into account 32-ounce or liter containers, but not 40-ounce containers. Therefore, 1985 to 1995 drinking-level estimates differ slightly from those reported in previous DoD survey reports. Tables A.5 through A.9 compare drinking-level estimates for 1985 to 1998 based on the algorithm used in previous reports and the algorithm used in this report.

^aAny nonmedical use of marijuana, PCP, LSD/hallucinogens, cocaine, amphetamines/stimulants, tranquilizers, barbiturates/sedatives, heroin/other opiates, analgesics, or inhalants. "Designer" drugs also are included for 1988, 1992, 1995, and 1998.

^bComparisons between this survey and the preceding survey are statistically significant at the 95% confidence level.

^cComparisons between 1980 and 1998 are statistically significant at the 95% confidence level.

^dThis estimate was incorrectly reported as 9.1 (3.9) in the 1995 report.

Source: DoD Surveys of Health Related Behaviors Among Military Personnel, 1980-1998 (1998 Questions: Alcohol Drinking Level, Q15-18 and 20-23; Any Illicit Drug Use: Past 30 Days, Q60 and 67, Past 12 Months, Q60-61 and 67; Cigarette Use, Past 30 Days: Any Smoking, Q44 and 47, Heavy Smoking, Q45; Alcohol Use Negative Effects: Serious Consequences, Q34 and 36, Productivity Loss, Q32A-F, Dependence, Q33A-C and E-F).

Table A.3 Substance Use Summary for the Marine Corps, 1980-1998

Measure	Year of Survey						
	1980	1982	1985	1988	1992	1995	1998
Alcohol Drinking Level							
Abstainer	10.4 (1.0)	13.5 (2.0)	10.8 (2.5)	18.0 (0.9) ^b	14.6 (0.5) ^b	16.4 (0.7) ^b	19.1 (0.8) ^{b,c}
Infrequent/light	11.0 (0.5)	13.2 (1.8)	13.6 (1.7)	16.1 (2.9)	14.4 (1.2)	13.9 (0.7)	17.5 (0.8) ^{b,c}
Moderate	17.6 (1.2)	14.9 (0.3) ^b	15.1 (2.1)	13.9 (1.0)	19.5 (1.5) ^b	17.2 (1.1)	17.3 (1.2)
Moderate/heavy	32.4 (1.4)	27.8 (0.7) ^b	31.1 (1.8)	27.6 (1.9)	25.4 (1.9)	24.0 (0.9)	23.1 (1.1) ^c
Heavy	28.6 (2.5)	30.6 (0.9)	29.4 (3.7)	24.4 (4.2)	26.0 (1.3)	28.6 (2.5)	23.0 (2.1)
Any Illicit Drug Use^a							
Past 30 days	37.7 (3.0)	20.6 (2.0) ^b	9.9 (3.2) ^b	4.0 (0.7)	5.6 (1.0)	3.6 (0.8)	3.3 (0.4) ^c
Past 12 months	48.0 (3.1)	29.9 (3.2) ^b	14.7 (3.8) ^b	7.8 (1.0)	10.7 (1.3)	7.3 (1.2)	7.2 (0.8) ^c
Cigarette Use, Past 30 Days							
Any smoking	53.4 (0.6)	48.7 (0.4) ^b	42.6 (3.1)	41.3 (1.8)	39.2 (2.3)	35.0 (1.8)	34.9 (2.1) ^c
Heavy smoking	34.5 (0.9)	31.6 (0.7) ^b	26.1 (0.8) ^b	18.7 (2.2) ^b	20.7 (1.8)	15.0 (1.2) ^b	13.5 (1.1) ^c
Alcohol Use Negative Effects							
Serious consequences	26.2 (2.2)	19.7 (1.0) ^b	12.3 (1.7) ^b	17.0 (3.4)	14.8 (2.1) ^d	14.7 (1.6)	12.5 (1.3) ^c
Productivity loss	34.1 (1.6)	37.6 (1.2)	29.0 (5.0)	32.0 (3.8)	25.6 (1.9)	21.8 (1.9)	19.2 (1.3) ^c
Dependence	11.8 (1.2)	10.2 (1.8)	7.6 (1.4)	9.8 (1.7)	11.2 (1.7)	9.6 (1.1)	8.2 (1.2)

Note: Table entries are percentages (with standard errors in parentheses). Definitions and measures of substance use are given in Section 2.2. The algorithm for computing drinking levels was altered for this report as follows: Estimates for drinking levels for 1998 take into account both 32-ounce or liter and 40-ounce size containers. Estimates for drinking levels for 1985 to 1995 take into account 32-ounce or liter containers, but not 40-ounce containers. Therefore, 1985 to 1995 drinking-level estimates differ slightly from those reported in previous DoD survey reports. Tables A.5 through A.9 compare drinking-level estimates for 1985 to 1998 based on the algorithm used in previous reports and the algorithm used in this report.

^aAny nonmedical use of marijuana, PCP, LSD/hallucinogens, cocaine, amphetamines/stimulants, tranquilizers, barbiturates/sedatives, heroin/other opiates, analgesics, or inhalants. "Designer" drugs also are included for 1988, 1992, 1995, and 1998.

^bComparisons between this survey and the preceding survey are statistically significant at the 95% confidence level.

^cComparisons between 1980 and 1998 are statistically significant at the 95% confidence level.

^dThis estimate was incorrectly reported as 15.7 (1.8) in the 1995 report.

Source: DoD Surveys of Health Related Behaviors Among Military Personnel, 1980-1998 (1998 Questions: Alcohol Drinking Level, Q15-18 and 20-23; Any Illicit Drug Use: Past 30 Days, Q60 and 67, Past 12 Months, Q60-61 and 67; Cigarette Use, Past 30 Days: Any Smoking, Q44 and 47, Heavy Smoking, Q45; Alcohol Use Negative Effects: Serious Consequences, Q34 and 36, Productivity Loss, Q32A-F, Dependence, Q33A-C and E-F).

Table A.4 Substance Use Summary for the Air Force, 1980-1998

Measure	Year of Survey					
	1980	1982	1985	1988	1992	1995
Alcohol Drinking Level						
Abstainer	15.0 (1.0)	12.6 (0.7) ^b	15.6 (1.0) ^b	18.4 (0.8) ^b	21.1 (0.8) ^b	24.2 (0.9) ^b
Infrequent/light	12.6 (0.5)	17.3 (0.8) ^b	15.4 (0.8)	18.1 (0.8) ^b	21.3 (0.9) ^b	20.5 (0.9)
Moderate	24.9 (1.2)	19.8 (0.7) ^b	20.9 (1.2)	19.7 (0.8)	21.5 (0.7)	20.5 (0.7)
Moderate/heavy	33.2 (0.9)	32.6 (0.8)	31.5 (1.2)	29.2 (1.1)	25.4 (0.8) ^b	24.5 (1.0)
Heavy	14.3 (1.4)	17.7 (1.2)	16.5 (1.4)	14.5 (1.0)	10.6 (0.8) ^b	10.4 (1.1)
Any Illicit Drug Use^a						
Past 30 days	14.5 (1.1)	11.9 (1.5)	4.5 (0.8) ^b	2.1 (0.4) ^b	1.2 (0.2) ^b	1.0 (0.2)
Past 12 months	23.4 (1.7)	16.4 (1.8) ^b	7.2 (0.9) ^b	3.8 (0.6) ^b	2.3 (0.3) ^b	2.5 (0.4)
Cigarette Use, Past 30 Days						
Any smoking	43.2 (1.8)	44.1 (1.6)	39.0 (2.3)	35.8 (1.2)	29.2 (1.4) ^b	25.1 (1.3) ^b
Heavy smoking	29.7 (1.3)	30.6 (1.2)	26.8 (1.7)	22.0 (0.8) ^b	14.6 (1.0) ^b	11.2 (0.8) ^b
Alcohol Use Negative Effects						
Serious consequences	9.0 (0.8)	8.0 (0.8)	4.7 (0.5)	3.9 (0.5)	3.5 (0.4) ^d	3.7 (0.5)
Productivity loss	20.7 (1.2)	28.0 (2.7) ^b	19.4 (1.1)	15.5 (0.8) ^b	10.6 (0.5) ^b	9.9 (0.6)
Dependence	4.3 (0.6)	3.7 (0.7)	3.3 (0.5)	3.8 (0.4)	2.7 (0.3) ^b	3.0 (0.6)
						2.8 (0.5)

Note: Table entries are percentages (with standard errors in parentheses). Definitions and measures of substance use are given in Section 2.2. The algorithm for computing drinking levels was altered for this report as follows: Estimates for drinking levels for 1998 take into account both 32-ounce or liter and 40-ounce size containers. Estimates for drinking levels for 1985 to 1995 take into account 32-ounce or liter containers, but not 40-ounce containers. Therefore, 1985 to 1995 drinking-level estimates differ slightly from those reported in previous DoD survey reports. Tables A.5 through A.9 compare drinking-level estimates for 1985 to 1998 based on the algorithm used in previous reports and the algorithm used in this report.

^aAny nonmedical use of marijuana, PCP, LSD/hallucinogens, cocaine, amphetamines/stimulants, tranquilizers, barbiturates/sedatives, heroin/other opiates, analgesics, or inhalants. "Designer" drugs also are included for 1988, 1992, 1995, and 1998.

^bComparisons between this survey and the preceding survey are statistically significant at the 95% confidence level.

^cComparisons between 1980 and 1998 are statistically significant at the 95% confidence level.

^dThis estimate was incorrectly reported as 3.8 (0.4) in the 1995 report.

Source: DoD Surveys of Health Related Behaviors Among Military Personnel, 1980-1998 (1998 Questions: Alcohol Drinking Level, Q15-18 and 20-23; Any Illicit Drug Use: Past 30 Days, Q60 and 67, Past 12 Months, Q60-61 and 67; Cigarette Use, Past 30 Days: Any Smoking, Q44 and 47, Heavy Smoking, Q45; Alcohol Use Negative Effects: Serious Consequences, Q34 and 36, Productivity Loss, Q32A-F, Dependence, Q33A-C and E-F).

Table A.5 Trends in Drinking Levels Based on Two Estimation Procedures for the Total DoD, 1985-1998

Drinking Level/ Procedure	Year				
	1985	1988	1992	1995	1998
Abstainer					
Procedure A ^a	13.4 (0.6)	17.2 (0.4)	20.4 (0.8)	21.1 (0.5)	24.3 (0.6)
Procedure B ^b	13.3 (0.6)	17.2 (0.4)	20.0 (0.8)	20.7 (0.5)	23.8 (0.6)
Infrequent/Light					
Procedure A ^a	16.6 (0.7)	17.6 (0.5)	18.9 (0.5)	18.6 (0.6)	19.7 (0.5)
Procedure B ^b	16.5 (0.7)	17.5 (0.5)	18.5 (0.4)	18.5 (0.6)	19.4 (0.5)
Moderate					
Procedure A ^a	18.6 (0.6)	19.5 (0.5)	19.6 (0.5)	18.9 (0.5)	18.2 (0.5)
Procedure B ^b	18.7 (0.6)	19.4 (0.5)	19.6 (0.5)	19.0 (0.5)	18.1 (0.5)
Moderate/Heavy					
Procedure A ^a	28.5 (0.8)	28.7 (0.7)	26.0 (0.6)	24.2 (0.6)	22.8 (0.4)
Procedure B ^b	28.5 (0.8)	28.8 (0.7)	26.3 (0.6)	24.5 (0.6)	23.2 (0.5)
Heavy					
Procedure A ^a	22.9 (1.1)	17.0 (0.9)	15.1 (0.7)	17.1 (0.8)	15.0 (0.8)
Procedure B ^b	23.0 (1.1)	17.2 (0.9)	15.5 (0.8)	17.4 (0.9)	15.4 (0.8)

Note: Estimates are percentages (with standard errors in parentheses).

^aBased on procedure used in the 1980 and 1982 surveys. Does not take into account reports of typical consumption of beer in 32-ounce or liter containers or 40-ounce containers. Response category for typical consumption of beer in 32-ounce or liter containers and 40-ounce containers was not included in the 1980 and 1982 surveys.

^bTakes into account reports of typical consumption of beer in 32-ounce or liter containers for 1985 to 1995 and 32-ounce and 40-ounce containers for 1998. Response category for typical consumption of beer in 32-ounce or liter containers was included beginning with the 1985 survey, and response category for 40-ounce containers was included in the 1998 survey.

Source: DoD Surveys of Health Related Behaviors Among Military Personnel, 1985 to 1998 (1998 Questions: Drinking Level, Q15-18 and 20-23).

Table A.6 Trends in Drinking Levels Based on Two Estimation Procedures for the Army, 1985-1998

Drinking Level/ Procedure	Year				
	1985	1988	1992	1995	1998
Abstainer					
Procedure A ^a	14.9 (0.7)	17.1 (0.7)	21.8 (1.4)	21.1 (1.0)	23.7 (1.3)
Procedure B ^b	14.6 (0.7)	17.0 (0.7)	21.4 (1.4)	20.6 (1.0)	23.1 (1.3)
Infrequent/Light					
Procedure A ^a	16.6 (1.1)	17.0 (0.9)	17.7 (0.6)	18.1 (1.4)	19.5 (1.1)
Procedure B ^b	16.4 (1.1)	16.8 (0.9)	17.2 (0.6)	18.0 (1.4)	18.8 (1.0)
Moderate					
Procedure A ^a	17.6 (0.7)	19.5 (0.8)	17.3 (0.8)	18.1 (0.9)	17.0 (0.7)
Procedure B ^b	17.8 (0.7)	19.5 (0.7)	17.3 (0.8)	18.0 (1.0)	16.9 (0.7)
Moderate/Heavy					
Procedure A ^a	25.6 (1.8)	27.0 (0.8)	26.1 (1.4)	24.7 (1.0)	23.4 (0.8)
Procedure B ^b	25.7 (1.8)	27.1 (0.8)	26.5 (1.4)	25.0 (1.1)	24.0 (0.8)
Heavy					
Procedure A ^a	25.2 (2.2)	19.4 (1.1)	17.1 (1.5)	18.0 (1.8)	16.5 (1.5)
Procedure B ^b	25.5 (2.2)	19.7 (1.2)	17.7 (1.6)	18.4 (1.8)	17.2 (1.6)

Note: Estimates are percentages (with standard errors in parentheses).

^aBased on procedure used in the 1980 and 1982 surveys. Does not take into account reports of typical consumption of beer in 32-ounce or liter containers or 40-ounce containers. Response category for typical consumption of beer in 32-ounce or liter containers and 40-ounce containers was not included in the 1980 and 1982 surveys.

^bTakes into account reports of typical consumption of beer in 32-ounce or liter containers for 1985 to 1995 and 32-ounce and 40-ounce containers for 1998. Response category for typical consumption of beer in 32-ounce or liter containers was included beginning with the 1985 survey, and response category for 40-ounce containers was included in the 1998 survey.

Source: DoD Surveys of Health Related Behaviors Among Military Personnel, 1985 to 1998 (1998 Questions: Drinking Level, Q15-18 and 20-23).

Table A.7 Trends in Drinking Levels Based on Two Estimation Procedures for the Navy, 1985-1998

Drinking Level/ Procedure	Year				
	1985	1988	1992	1995	1998
Abstainer					
Procedure A ^a	9.6 (0.8)	15.7 (0.6)	19.9 (2.1)	19.4 (0.9)	24.4 (1.0)
Procedure B ^b	9.6 (0.8)	15.7 (0.6)	19.6 (1.9)	19.0 (0.9)	24.1 (1.0)
Infrequent/Light					
Procedure A ^a	18.8 (2.0)	18.3 (0.9)	19.1 (1.1)	19.0 (1.1)	19.5 (0.9)
Procedure B ^b	18.8 (2.0)	18.2 (0.9)	18.6 (0.9)	18.7 (1.1)	19.3 (0.9)
Moderate					
Procedure A ^a	18.7 (1.1)	20.8 (1.2)	20.2 (1.2)	19.0 (1.0)	19.0 (1.1)
Procedure B ^b	18.7 (1.0)	20.7 (1.2)	20.2 (1.2)	19.2 (0.9)	18.8 (1.2)
Moderate/Heavy					
Procedure A ^a	27.9 (1.4)	30.6 (1.5)	27.0 (0.7)	23.8 (1.6)	24.0 (0.9)
Procedure B ^b	27.9 (1.4)	30.7 (1.5)	27.4 (0.7)	24.0 (1.6)	24.3 (1.0)
Heavy					
Procedure A ^a	24.9 (1.4)	14.6 (2.0)	13.8 (1.4)	18.8 (1.4)	13.2 (1.7)
Procedure B ^b	25.0 (1.4)	14.7 (2.0)	14.2 (1.7)	19.1 (1.5)	13.5 (1.8)

Note: Estimates are percentages (with standard errors in parentheses).

^aBased on procedure used in the 1980 and 1982 surveys. Does not take into account reports of typical consumption of beer in 32-ounce or liter containers or 40-ounce containers. Response category for typical consumption of beer in 32-ounce or liter containers and 40-ounce containers was not included in the 1980 and 1982 surveys.

^bTakes into account reports of typical consumption of beer in 32-ounce or liter containers for 1985 to 1995 and 32-ounce and 40-ounce containers for 1998. Response category for typical consumption of beer in 32-ounce or liter containers was included beginning with the 1985 survey, and response category for 40-ounce containers was included in the 1998 survey.

Source: DoD Surveys of Health Related Behaviors Among Military Personnel, 1985 to 1998 (1998 Questions: Drinking Level, Q15-18 and 20-23).

Table A.8 Trends in Drinking Levels Based on Two Estimation Procedures for the Marine Corps, 1985-1998

Drinking Level/ Procedure	Year				
	1985	1988	1992	1995	1998
Abstainer					
Procedure A ^a	10.8 (2.5)	18.0 (0.9)	15.0 (0.6)	16.9 (0.7)	19.7 (0.9)
Procedure B ^b	10.8 (2.5)	18.0 (0.9)	14.6 (0.5)	16.4 (0.7)	19.1 (0.8)
Infrequent/Light					
Procedure A ^a	13.6 (1.7)	16.1 (2.9)	15.4 (1.2)	14.2 (0.6)	17.8 (0.9)
Procedure B ^b	13.6 (1.7)	16.1 (2.9)	14.4 (1.2)	13.9 (0.7)	17.5 (0.8)
Moderate					
Procedure A ^a	15.1 (2.1)	14.0 (1.0)	19.2 (1.4)	17.4 (1.1)	17.3 (1.2)
Procedure B ^b	15.1 (2.1)	13.9 (1.0)	19.5 (1.5)	17.2 (1.1)	17.3 (1.2)
Moderate/Heavy					
Procedure A ^a	31.1 (1.8)	27.8 (1.6)	25.1 (1.9)	23.6 (1.0)	22.7 (1.0)
Procedure B ^b	31.1 (1.8)	27.6 (1.9)	25.4 (1.9)	24.0 (0.9)	23.1 (1.1)
Heavy					
Procedure A ^a	29.4 (3.7)	24.1 (3.9)	25.3 (1.3)	27.8 (2.4)	22.4 (2.0)
Procedure B ^b	29.4 (3.7)	24.4 (4.2)	26.0 (1.3)	28.6 (2.5)	23.0 (2.1)

Note: Estimates are percentages (with standard errors in parentheses).

^aBased on procedure used in the 1980 and 1982 surveys. Does not take into account reports of typical consumption of beer in 32-ounce or liter containers or 40-ounce containers. Response category for typical consumption of beer in 32-ounce or liter containers and 40-ounce containers was not included in the 1980 and 1982 surveys.

^bTakes into account reports of typical consumption of beer in 32-ounce or liter containers for 1985 to 1995 and 32-ounce and 40-ounce containers for 1998. Response category for typical consumption of beer in 32-ounce or liter containers was included beginning with the 1985 survey, and response category for 40-ounce containers was included in the 1998 survey.

Source: DoD Surveys of Health Related Behaviors Among Military Personnel, 1985 to 1998 (1998 Questions: Drinking Level, Q15-18 and 20-23).

Table A.9 Trends in Drinking Levels Based on Two Estimation Procedures for the Air Force, 1985-1998

Drinking Level/ Procedure	Year				
	1985	1988	1992	1995	1998
Abstainer					
Procedure A ^a	15.8 (1.0)	18.5 (0.8)	21.3 (0.9)	24.4 (0.9)	27.0 (1.2)
Procedure B ^b	15.6 (1.0)	18.4 (0.8)	21.1 (0.8)	24.2 (0.9)	26.6 (1.1)
Infrequent/Light					
Procedure A ^a	15.4 (0.8)	18.2 (0.8)	21.3 (0.9)	20.5 (0.9)	21.1 (0.8)
Procedure B ^b	15.4 (0.8)	18.1 (0.8)	21.3 (0.9)	20.5 (0.9)	21.1 (0.8)
Moderate					
Procedure A ^a	20.8 (1.2)	19.8 (0.8)	21.5 (0.8)	20.5 (0.7)	19.3 (1.0)
Procedure B ^b	20.9 (1.2)	19.7 (0.8)	21.5 (0.7)	20.5 (0.7)	19.4 (1.0)
Moderate/Heavy					
Procedure A ^a	31.5 (1.1)	29.1 (1.1)	25.4 (0.9)	24.3 (1.0)	21.0 (0.9)
Procedure B ^b	31.5 (1.2)	29.2 (1.1)	25.4 (0.8)	24.5 (1.0)	21.3 (0.9)
Heavy					
Procedure A ^a	16.4 (1.4)	14.4 (1.0)	10.5 (0.8)	10.3 (1.1)	11.6 (1.1)
Procedure B ^b	16.5 (1.4)	14.5 (1.0)	10.6 (0.8)	10.4 (1.1)	11.7 (1.0)

Note: Estimates are percentages (with standard errors in parentheses).

^aBased on procedure used in the 1980 and 1982 surveys. Does not take into account reports of typical consumption of beer in 32-ounce or liter containers or 40-ounce containers. Response category for typical consumption of beer in 32-ounce or liter containers and 40-ounce containers was not included in the 1980 and 1982 surveys.

^bTakes into account reports of typical consumption of beer in 32-ounce or liter containers for 1985 to 1995 and 32-ounce and 40-ounce containers for 1998. Response category for typical consumption of beer in 32-ounce or liter containers was included beginning with the 1985 survey, and response category for 40-ounce containers was included in the 1998 survey.

Source: DoD Surveys of Health Related Behaviors Among Military Personnel, 1985 to 1998 (1998 Questions: Drinking Level, Q15-18 and 20-23).

Table A.10 Trends in Average Daily Ounces of Ethanol Consumed Based on Two Estimation Procedures, 1985-1998

Service/ Average Ounces	Year				
	1985	1988	1992	1995	1998
Total DoD					
Procedure A ^a	1.22 (0.06)	0.90 (0.03)	0.75 (0.04)	0.83 (0.04)	0.72 (0.02)
Procedure B ^b	1.24 (0.06)	0.92 (0.03)	0.79 (0.04)	0.87 (0.04)	0.79 (0.04)
Army					
Procedure A ^a	1.38 (0.12)	1.09 (0.06)	0.83 (0.06)	0.92 (0.07)	0.84 (0.06)
Procedure B ^b	1.42 (0.13)	1.12 (0.06)	0.90 (0.06)	0.98 (0.07)	0.94 (0.07)
Navy					
Procedure A ^a	1.33 (0.10)	0.86 (0.07)	0.80 (0.10)	0.91 (0.08)	0.66 (0.06)
Procedure B ^b	1.34 (0.10)	0.88 (0.08)	0.85 (0.11)	0.93 (0.08)	0.70 (0.07)
Marine Corps					
Procedure A ^a	1.47 (0.22)	1.16 (0.12)	1.00 (0.06)	1.11 (0.07)	1.00 (0.11)
Procedure B ^b	1.49 (0.23)	1.20 (0.11)	1.04 (0.06)	1.19 (0.07)	1.08 (0.11)
Air Force					
Procedure A ^a	0.86 (0.07)	0.65 (0.03)	0.52 (0.03)	0.53 (0.04)	0.52 (0.04)
Procedure B ^b	0.87 (0.07)	0.66 (0.03)	0.52 (0.03)	0.54 (0.04)	0.54 (0.04)

Note: Estimates are percentages (with standard errors in parentheses).

^aBased on procedure used in the 1980 and 1982 surveys. Does not take into account reports of typical consumption of beer in 32-ounce or liter containers or 40-ounce containers. Response category for typical consumption of beer in 32-ounce or liter containers and 40-ounce containers was not included in the 1980 and 1982 surveys.

^bTakes into account reports of typical consumption of beer in 32-ounce or liter containers for 1985 to 1995 and 32-ounce and 40-ounce containers for 1998. Response category for typical consumption of beer in 32-ounce or liter containers was included beginning with the 1985 survey, and response category for 40-ounce containers was included in the 1998 survey.

Source: DoD Surveys of Health Related Behaviors Among Military Personnel, 1985 to 1998 (1998 Questions: Average Daily Ounces of Ethanol, Q15-23 and 28-30).

APPENDIX B

DOD's SURVEY LIAISON OFFICERS

1998 DoD Survey Liaison Officers

ARMY LTC Shirley Newcomb (HLO)	NAVY LT Tim Williams (HLO)
MAJ Lynn Conners MAJ Richard Edwards LTC Brian Feighner 1LT Ethan Ford MAJ Janice Fulton Ms. Pat Inglett Mr. Charles Kennedy Ms. Anita Kolb CPT Mack David Lacey MAJ Dave Mitchell CPT Scott Mower LTC Craig Ono Ms. Joyce Patrick LTC Bruno Petruccelli 1LT Stephan Porter SFC Lance Tomiczek	LT Barry Adams LT David Collins CDR Christine Edwards Ms. Linda Fentress SCPO Madge Haughton LCDR Ally Hutto LT Ralph Jesse LCDR Larue, MD LT Rob Metz LT Kari Mills LT John Payne MCPO Gary Schiffert LT Tracey Swanson
MARINE CORPS Terrance Zline (HLO)	AIR FORCE LTC James Fraser (HLO)
MAJ B.L. Barnes 1LT Linwood Bridgeforth Mr. David Forkenbrock MAJ Carlos Kizzee Mr. George Mangual LTC Dave Reintjes MAJ Mark Roberts MAJ Michael Spartonos	TSGT Breuer 2LT Scott Clark LTC Edward Cotton LTC Lou Daniels MSGT Donna Ferguson MAJ Sandra Gatewood CAPT Alina Khalife CAPT James King CAPT Joseph Narrigan MAJ Sherry Sasser CAPT Lisa Schmidt CAPT Naomi Strano MAJ Susan Weddle

Note: Names below each Service are the Military Liaison Officers who coordinated data collection field operations at participating installations.

HLO = Headquarters Liaison Officer.